SCIENCE AND INDUSTRY Sci Lib B

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Contractors and Engineers Monthly

Vol. 40, No. 3 MARCH, 1943 $2 a Year, 20 Cents a Copy

Highlights Of This Issue

Equipment Maintenance

State and county highway departments as well as contractors are giving ever-increasing attention to the maintenance and repair of their equipment, knowing that present equipment must do the job for the duration. An unusual and well-equipped county highway department shop and the ingenuity shown in a state highway department shop in caring for highway equipment are described in this issue, which also contains an article on the proper care of rock crushers. See pages 1, 27 and 42.

Military Construction

A variety of construction for war is described in this issue, including the concrete paving of airport runways; paving Army warehouse floors with hot-mix; concrete production and pouring for storage igloos at an Army Ordnance Depot; and cold-mix paving of roads and runways at a Canadian airport.

See pages 2, 11 and 52.

Road Construction

The only highway construction going on at present is on access roads or sections of the strategic network deemed essential to the war effort. Examples in this issue include the reconstruction of a section of U. S. 85 in New Mexico, with a stabilized base and ballast course; the construction of 3.5 miles of access road to a Utah air base, consisting of an oil mat topped with rock asphalt; and the grading of a new dual highway to provide air-field access in Ohio.

See pages 2, 9 and 39.

Alcan Highway

Much has been written about this magnificent accomplishment of U. S. Engineers and private contractors working together to produce a 1,570-mile route in record time. In this issue we are pleased to bring you some of the personal experiences of an official photographer of the work. See page 19.

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SALT LAKE COUNTY

Proud to Display Minute Man Flag; New Garage and Unique Gravel Plant

Well-Organized County Has Honor of Being First in Utah to Fly Banner, First Government Unit in Nation

(*Photo on page 64*)

✦ SALT LAKE County knows there's a War and is buying bonds till it hurts—not just 10 per cent, but 14 per cent. The staff of the County Highway Department is not being paid war wages, but it has the war spirit and knows that war stamps buy bullets and bonds buy bombers. They now display the Treasury Department Minute Man flag indicating that every employee is signed up to put 10 per cent of his wages into war stamps and bonds. Great pride is felt in the knowledge that they were the first governmental unit in the nation to have this status.

The New Garage

On the evening of August 22, 1942, the County Highway Department staged a celebration in the new garage which they had completed over a period of about a year, using only such time as was available when the weather would not permit outside work. The new section replaces an old wooden structure which had only 11-foot clearance, where the roof had not sagged, and 8 x 8-inch wood posts which cluttered up the floor

C. & E. M. Photo

The Salt Lake County Highway Department Minute Man Banner.

area. The new garage is a replica in construction and size of the other section which was completed four years ago. It is 100 x 200 feet in area with reinforced-concrete piers, brick ends and steel trusses supporting a built-up roof. With the new section as a storage garage and the older part for a shop, the county is admirably equipped for the storage and care of its highway equipment.

At the front of the garage is the office of the County Road Superintendent and the chief clerk's office where an Operadio system is installed so that men in any part of the shops or garage can be called from the master station through

(*Continued on page 16*)

With a Mountain of Gravel As a Background, Plant is Fed by Bulldozer; Material To Storage Bin or Drier

(*Photo on page 64*)

✦ THE gravel and asphalt plants, two separate units that work as one when needed, are a feature of the Road and Bridge Department of Salt Lake County, Utah. The largest gravel pit worked by the county is located to the south of Salt Lake City and immediately east of Murray. For some time this one pit, on the scenic loop drive from Salt Lake City, has supplied the major requirements of crushed gravel for the county. Gravel from the sloping hillside is pushed down by a Caterpillar Fifty diesel, equipped with a LeTourneau bulldozer, onto a rail grizzly where oversize is hand sledged to pass into a hopper and to the reciprocating feeder of a Cedarapids 9 x 36 jaw crusher run by a Cummins diesel engine. The crusher-run material is picked up by a 40-foot belt 18 inches wide and carried to a rotary screen with the two outer sections covered with sheet metal so that the material passing the screen drops to the center and onto a second 40-foot 18-inch belt which carries the crushed and screened material up to the storage bins. The oversize goes by bucket elevator back to the crusher for recrushing.

On top of the bins is a second rotary screen which sizes the crushed material into sand, ⅜-inch pea gravel and 1½-inch concrete aggregate, and delivers it to the three compartments of the bin for loading to trucks below. If it is desired to use the crusher-run material for road gravel, the screen is removed and the entire bin used for the storage of the crushed bank-run gravel and sand.

When the adjacent asphalt plant is in operation producing oil mulch, a crusher-run hot-mix material, the screen over the top of the bins is removed and a 30-foot horizontal belt is placed over the bins, delivering the crushed material direct from the crusher belt to a chute on the far side of the bins which feeds directly into the drier of the asphalt plant. By these three combinations the crushing plant is able to serve the entire needs of the county for crusher-run sand and gravel, pea gravel for seal treatment of the roads, concrete aggregate for various purposes, or crusher-run material for hot-mix asphalt-plant aggregate.

The asphalt plant is a Standard Steel Corp. 3,000-pound-batch plant. The

(*Concluded on page 7*)

THE SEABEES GO INTO ACTION

Official U. S. Navy Photo

The Seabees, members of the Navy's Construction Battalions, build a ramp from landing barge to shore, preparatory to unloading heavy construction equipment and other supplies to be used in building the advance base on Island "X". These advance bases are used by all U. S. forces, land, sea and air, as repair and refueling stations. The Seabees, while primarily a construction unit, are trained to work or fight, as the occasion requires.

Coordination of Equipment Speeded Army Runway Job

Contractor Set Hot Pace With 6,000-Foot Concrete Runway Completed in Two Full Weeks of Work

✦ IT was not the heat that started the hot pace, but deliberate pressure by the Air Corps because they wanted the big new air field as quickly as possible. The contractor really needed no pressure, because he knows the way to keep every man occupied to the best effect at top speed for the full working day. The real secret behind pouring up to 2,800 feet of 9-7-7-9-inch slab, 25 feet wide, in 12 hours is the handling of equipment.

No time was lost when a turn was made from one lane of the runway to the next, because the second paver was still working while the first was making the turn. Figuring back from production to time, actually only 10 minutes of working time was lost for a turn. While there were two puddlers in front of the Blaw-Knox spreader, their only work was to shovel concrete under the key on the forms so there would be no air pockets beneath. The use of four tank trucks for paver water eliminated a pipe gang and left the slabs and shoulder free of incumbrances. Incidentally, the spreader was Serial No. 1 of the 22-foot model and the contractor widened it himself for the 25-foot slab. Its use saved puddlers and left no doubt that the concrete was spread uniformly.

Nicely distributed over about 100 feet from first paver to longitudinal finisher, work was pushed steadily with plenty of room for every operation without interference from any other operation.

Prepared Subgrade

The flexible base for the concrete runway was a selected material consisting of caliche gravel hauled from a borrow pit about 2 miles from the limits of the field. It was loaded by draglines and hauled to the runways, spread, and compacted by sheepsfoot and pneumatic rollers to a 6-inch layer having a minimum compaction of 95 per cent Proctor density.

The Blaw-Knox forms were set as soon as possible on the base and a planer pulled over the forms by a Caterpillar Thirty tractor to cut the thickened edge which extended 3 feet from the forms. The grade was then rolled by both 7½-ton steel wheel rollers and pneumatic rollers. The forms were set with wooden keys on the inside to make a 2 x 2-inch key with 45-degree slopes top and bottom to provide load transfer at the joint. The forms were oiled and the grade wet before the pouring of concrete started.

C. & E. M. Photo
Working out surface bubbles with a 1-inch rubber hose, after surface-checking by 10-foot straight-edges.

Wood Joints

Expansion joints were placed every 120 feet in the runway slabs and at points where runways crossed each other. The expansion material was a CRA redwood plank 1 inch thick planed, set with fourteen special connectors to transfer the load between adjacent slabs. The plank joint was broken at the center of the slab but galvanized plates were nailed to the two pieces to insure a smooth face. Five single pins with hook tops were driven on the far side of the plank from the paver until the hook was firm against the top of the plank. After the concrete was poured on both sides of a joint and the pins pulled, a string was used by the inspectors to determine the straightness of the joint and it was reset when necessary.

Dummy joints were cut every 15 feet, as described later in this article.

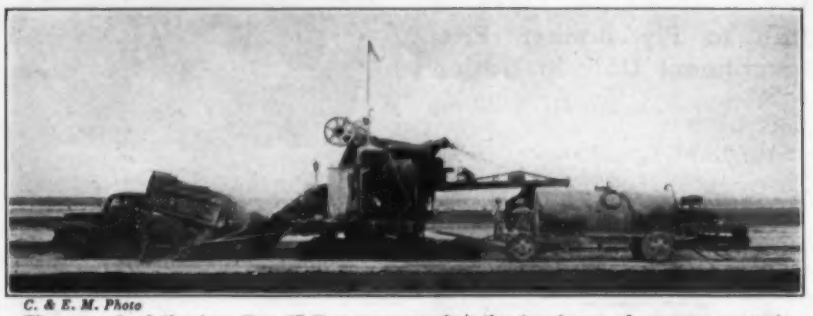
Pouring and Spreading

The batches for the concrete pavers were weighed out at a batching plant nearby and delivered in 2-batch trucks to the site. The aggregate, with a 2½-inch maximum screen size, was mixed one minute in the paver and delivered with a 2½ to 3-inch slump. The batches for the first and second pavers were identical. Each 25-foot slab was poured flat, that is without crown, but adjacent slabs sloped toward the outer edge of the 150-foot runway to provide all-over drainage of the surface.

The first Rex 27-E paver ran on the outside of the forms off the slab so as to leave the subgrade undisturbed. One man dumped the batches while the paver operator carefully spotted the mixed batches close to the spreader fin of the Blaw-Knox spreader which kept the concrete from the first paver 3 inches below the top of the forms. Tank trucks were used to supply water for the pavers. The second paver of the same make and size operated on the same side as the first, delivering its batches on the struck-off layer of concrete spread by the B-K machine.

The two men who were acting as puddlers in front of the spreader were used only for filling the space below the key on the forms instead of the usual operation of shoveling the concrete to

(Concluded on page 24)



C. & E. M. Photo
The second of the two Rex 27-E pavers pouring the top layer of runway concrete at a Southwest Army Air Field.

Warehouse Floors Of Sand-Asphalt Mix

Portable Asphalt Plant, Set at Center of Area of Warehouses to be Paved, Has Good Production

✦ TO find a place for a complete hot-mix asphalt plant, asphalt storage tank, steam boiler and other appurtenances, in the heart of an arsenal warehouse area and on a railroad track is not an easy task when there is always a call for the use of every bit of spare space for some other operation. The contractor responsible for paving the floors of a large group of warehouses at a southwestern Army arsenal located his plant in a narrow but accessible area, between a railroad track that could be used for supplying the plant and a street over which the finished product was hauled away.

Material Delivery

The sand aggregate for the sand-asphalt mix was delivered by rail and unloaded either direct to the feeding hopper of the plant or to a small storage area when the plant was not in operation. A Bucyrus-Erie crane with a ¾-yard Blaw-Knox clamshell bucket handled this part of the job. From the wood hopper the sand was fed at a uniform rate to the cold elevator of the plant by a Barber-Greene reciprocating apron feeder. The hopper had a second compartment, much smaller than the sand section, into which bags of limestone dust were fed at the rate of about 7 per cent of the total mix as produced. The limestone dust was stored in a shed for protection from rain and was carried up a short cleated ramp by hand to the hopper.

The asphalt for the job was received by rail in tank cars and heated by steam from a hand-fired coal-burning horizontal boiler located between the hot material conveyor and the railroad. The 12,000-gallon asphalt storage tank with its heating coils was located adjacent to the mixing plant at the far end from where the sand was unloaded and fed. Steam from the boiler was used to heat the tank car and also to heat and furnish power for the Altens asphalt reciprocating pump located alongside the track. The steam pump of the Barber-Greene plant was used to raise the asphalt from the storage tank to the plant and to meter it so that the final mix contained 5 per cent of the 85 to 100-penetration asphalt.

Producing Sand-Asphalt

The cold elevator raised the sand fed by the reciprocating unit to the twin 25-foot Barber-Greene oil-fired driers. These driers dropped the dried sand at a temperature of 250 to 300 degrees F. onto a 123-foot belt conveyor 18 inches wide. The belt used for the conveyor to carry the hot sand to the continuous mixing plant was specially treated to withstand this service and showed no signs of destructive wear from the hot sand.

The sand from the conveyor dropped into the hot feeder box of the Barber-Greene continuous mixing plant and was metered by the short plant conveyor to the pug mixer at the same time as the plant asphalt pump delivered the mea-

(Concluded on page 36)

C. & E. M. Photo
An Etnyre 1,000-gallon distributor shooting between two small windrows of gravel on U. S. 85 in New Mexico.

New Ballast Course With Stabilized Base

SN Route Rebuilt Between Santa Fe and Las Vegas With Heavy Sub-Base and Base Course by Contract

✦ SEVERAL contracts were awarded early in 1942 by the New Mexico State Highway Department for the improvement of U. S. 85, a strategic network highway between Santa Fe and Las Vegas, running eastward from Rowe, N. M. Careful soil tests were made of the subgrade to determine its bearing power and then a crushed-gravel ballast course, or sub-base, varying from 6 to 20 inches in thickness, was laid 42 feet wide, using a 3-inch maximum size stone. The ballast course was carried 6 inches thick the full width of the 3 to 1 shoulder slopes to prevent erosion.

In the deep rock cuts the slopes are ½ to 1 and ¼ to 1 and the earth slopes vary from 1½ to 1 to 6 to 1, depending on the right-of-way and according to the need for fill material to save the cost of borrow off the right-of-way. For most of the distance, a 200-foot right-of-way was secured, but where the highway parallels the Santa Fe railroad the right-of-way was restricted in sections to as little as 40 feet on the railroad side. The old road meandered considerably, while the new highway is straighter with long sweeping curves. Where the old road was abandoned, the surface was scarified within sight of the new highway. This hastens the establishing of ground cover to blot out the old location.

Producing Aggregate

This article is a general description of the methods used on the group of projects rather than being confined to a single contract. The contractor on one of the projects, having insufficient equipment to carry on all of the operations, rented State Highway Department machines under existing rental schedules. In this case, a Cedarapids crushing and screening plant of 1,000-tons capacity per 10½ hours, not being used by the state at the time, was rented and produced all the aggregate for the ballast course as well as the base course.

The plant was set up in an acceptable gravel pit and the material stripped by a Caterpillar D8 with an Angledozer while another Caterpillar D8 with a LeTourneau bulldozer fed the material to the rail grizzly of the plant at the top of the pit. Three men kept the grizzly clear of stone that would not pass the 6-inch openings. The material was crushed, sized by the vibrating screens and the oversize returned to the crusher. The final discharge was by a long conveyor belt to a loading bin. The entire plant was powered by a Caterpillar D13,000 diesel engine.

The Base Course

The base course consisted of 4 inch-

(Concluded on page 20)

3 out of 4

have paved with TEXACO

TEXACO Asphalt in Wichita, Kans.

TEXACO Asphalt in Youngstown, Ohio

TEXACO Asphalt in Philadelphia, Pa.

TODAY'S roll call of U. S. cities with a population of 25,000 or more totals 413.

To municipal officials responsible for paving, it is significant that 3 out of 4 of these top-ranking cities have paved streets with TEXACO Asphalt . . . many have laid more than 500,000 square yards . . . some have laid more than 1,000,000 square yards . . . New York City has laid more than 5,000,000 square yards.

This popularity among the nation's largest cities is worth noting. As evidence of the long life and low upkeep cost of TEXACO Asphalt paving, it carries much weight.

THE TEXAS COMPANY, *Asphalt Sales Dept.*, 135 East 42nd St., New York City

Boston Philadelphia Richmond Chicago Jacksonville Houston

TEXACO REG. T. M.

TEXACO ASPHALT

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CONTRACTORS AND HIGHWAY ENGINEERS AND COMMISSIONERS

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What Does It Mean?

Does the motorist understand your warning and direction signs? Do they mean what they say? Remember the layman may not react to the sign in the same manner as the trained engineering mind. As an example, after a very careful study of safe speeds on curves Arizona placed warning signs reading "30 mph", or some other lower figure if necessary, well in advance of each curve sharper than 6 degrees.

Casual inquiries of lay motorists brought out the astounding information that the frequent repetition of those signs on a highway with many curves had impressed on the minds of the travelers that they were riding on "Highway 30". Truly shocking to the engineer who is accustomed to rpm, cfs, mph, and numerous time-saving non-political abbreviations. Arizona engineers immediately shifted to the more simple and effective "Speed 30".

Those Arizona signs mean what they say. You drive at the designated speed and you drive in comfort on a properly banked curve; exceed that speed and you find yourself fighting the curve. The study of curves was not theoretical, but started with a survey of the actual speeds that motor vehicles were driven habitually on curve after curve, checking the speeds with a fully equipped traffic car. Then the curves were run with a ball bank-indicator to determine whether the bank of the curve was adequate for the speed at which it was usually driven. The bank of each curve was then adjusted to the traffic speed to insure complete safety and each curve posted with its comfortable speed rather than the maximum safe speed.

At the same time the actual speed of traffic was used to determine the length of the no-passing zone approaching each curve. Frequently these are not the same on the two approaches, due to varying approach characteristics as well as speeds.

What do your direction arrows indicate? We are thoroughly convinced that the tails of all direction arrows should be kicked off. Very few states so design either double line or solid arrows so that a motorist approaching it is certain, at a quick glance, in just which direction the arrow is pointing. There is a bunch at either end, but which is the arrow and which the tail? Why not omit the tail in all cases and then there will be no moment of indecision on the part of the motorist—that moment which breeds accidents. But be sure to make the head big enough to be seen 500 or even 1,000 feet away. Better be sure than regret the saving of paint.

Why?

In pre-war days we smiled benevolently at inspectors straight-edging pavement after it had been broomed to give it a non-skid surface. But today, when man-power is scarce, to drive up to a concrete paving job and find two draftage inspectors with an aluminum Bumpometer slowly surveying the broomed pavement for irregularities of more than ⅛ inch in 10 feet and putting down streak after streak of red paint 3 and 4 feet long to indicate areas to be rubbed down, was too much. We are no longer benevolent.

We want pavements to ride well and that is why we have hurled barbed words against high joints, and why we have lauded the value of the mechanical longitudinal float. Irregularities in a pavement that will cause bumpy riding on pneumatic tires should be removed by grinding. But when the specifications require brooming, and one long fibre, or one small piece of concrete on a fibre may well raise a ridge ¼ inch above all others in 10 feet, then why get quite so finicky about Bumpometer readings? It seems a little too close for wartime. Yes, I know we will be riding those pavements long after the war, so if it is necessary let's grind them down later as an L.L.L. Project (Lazy Loafers' Leisure Project) under the Reshuffled Administration.

Further, the time of those two draftage inspectors could be used much better checking the finishing. Good finishers are scarcer than ever now and green finishers need constant checking. Also it takes labor to grind down ridges and that labor can be used to better advantage elsewhere today. As for the ⅛ inch mentioned in the specification, well, we believe that the toughest tires we will see for some time will absorb that ⅛-inch impact easily. In most states, high joints, curled joints, or extruded premoulded expansion-joint material make darned sight bigger bumps than the ⅛-inch ridge.

No Blame on Welding Because Ship Broke

The charge made by J. Lewis Luckenbach, President, American Bureau of Shipping, that lack of flexibility in welded ships caused the tanker Schenectady to break in two following launching has been discredited both by Henry J. Kaiser at whose Portland, Ore., shipyard the failure occurred, and J. F. Lincoln, President, Lincoln Electric Co.

Henry J. Kaiser refuses to admit the charge that welding was responsible and affirmed that engineering officials of his company would determine the true cause.

J. F. Lincoln in discussing the incident pointed out that there was "absolutely no failure of welds in this tanker, as proved by examination". Stating that it is useless to theorize as to what caused the sinking of the ship, he indicated three major facts which must be considered very carefully:

First, there are in operation at the present time several thousand ships which are completely or partially welded, which obviously had no difficulty, since some of them have been in operation for as much as 40 years.

Second, since the welded joint is much stronger than the plate and also is stronger than any riveted joint, the suspicion that the welded joint is the cause of failure is unsound.

Third, the point which is apt to be overlooked at times like these, and which may be the real cause of failure, is the possibility that the steel was defective. This might be due to improper scrap, the high pressure of production, the lack of adequate training of the steel operators who have replaced those gone to war, to less cropping of the ingot with very much less inspection of the finished steel. It is entirely possible that some of the plates had bad cases of segregation which would probably be the reason for failure. Mr. Lincoln concluded, "The one thing that has been established is that the breaks did not occur in the center of the plate."

"See here, Wilkins, will you stop telling these guys about those trenchers contractors use?"

Guard Blasting Caps From Boys and Girls

Most contractors and highway department employees carefully lock up blasting caps when they are not in use, as the law requires and as good practice dictates. Unfortunately there are cases of carelessness where caps are left lying about, dropped near a blasting operation, or in some other manner find their way to places where they are accessible to boys and girls. When they are found, it happens only too often that the children begin to tamper with them.

In many cases they hammer or pick at them; in other instances, they throw them into bonfires. Since blasting caps are filled with a powerful explosive, they are often detonated by this treatment, and the explosion throws particles of metal in all directions. Fingers are blown off, hands are often crippled, or eyes destroyed. There have been many instances where boys and girls, as the result of these accidents, have been made unfit for useful work in later life, and in some cases killed.

Although the number of such accidents has been reduced during the past several years, there are still enough of them to make necessary the most thoroughgoing cooperation among all users of explosives. If such accidents can be reduced, they can be eliminated.

The Institute of Makers of Explosives, 103 Park Ave., New York, N. Y., which initiated this campaign and has been extremely active in it, has prepared folders explaining the dangers of carelessness in handling explosives. It has also prepared posters, suitable for plant and other bulletin boards, which are available without charge.

By Capping Your Welding Rods You Can Save One Rod in Seven

Remember—Your Rods Are Critical Material; Wherever Possible, Save Metal for Victory Effort

1. Use each rod down as far as practical; no stub over 2 inches should ever be thrown away but should be saved for tacking. A discarded 2-inch stub from a 14-inch rod means about 14 per cent waste. Most deliveries take from six weeks to six months, even with high priorities, so HELP save rods.

2. Weld down to a minimum stub, then ground your next rod and cap it with the stub in your holder. It takes 3 seconds for the weld to cool, then you can resume welding. The added cap permits the use of the entire coated surface of the next rod.

3. Capped rods have two advantages: first, they conserve; and second, they permit welding in hard-to-get-at places because the cap may be applied at any angle. (Photographs, courtesy of Joseph T. Ryerson & Sons, Inc., Chicago)

Grease—When and Where

To help dirt movers care for their equipment and make it last longer, R. G. LeTourneau, Inc., Peoria, Ill., has prepared a quick reference lubrication chart on the complete LeTourneau line for free distribution and posting in your garages and shops. The 16 x 20-inch poster-size chart is boldly designed in big readable type and shows what points are to be lubricated at what intervals and recommends the proper lubricants to be used for the most efficient equipment operation.

When writing for your copy, ask for Bulletin G-1052 and mention this item.

Irving Opens Calif. Plant

The opening of a West Coast plant by the Irving Subway Grating Co., Long Island City, N. Y., to expedite the shipment of emergency landing airfield mats to our Armed Forces in the Pacific area, has been announced by Walter E. Irving, President. J. C. Lynn is General Manager of the Oakland plant, and James E. Irving, Assistant Secretary, will be Supervisor.

In an interview, Walter E. Irving reported that the Long Island City plant has already provided "many millions of square feet of mats to the Government", and stated, "In the not-too-distant future after the war similar inexpensive and wholly dependable airports may be almost as commonplace as the back-yard garage."

Heacock Is Appointed To New WPB Position

Announcement has been made by Curtis E. Calder, Director General for Operations, War Production Board, of the appointment of B. C. Heacock as Deputy Director General for Distribution. Mr. Heacock, who is Chairman of the Executive Committee of the Caterpillar Tractor Co., joined WPB last December as Director of the Priorities Control Division.

★★★★

General Contractor

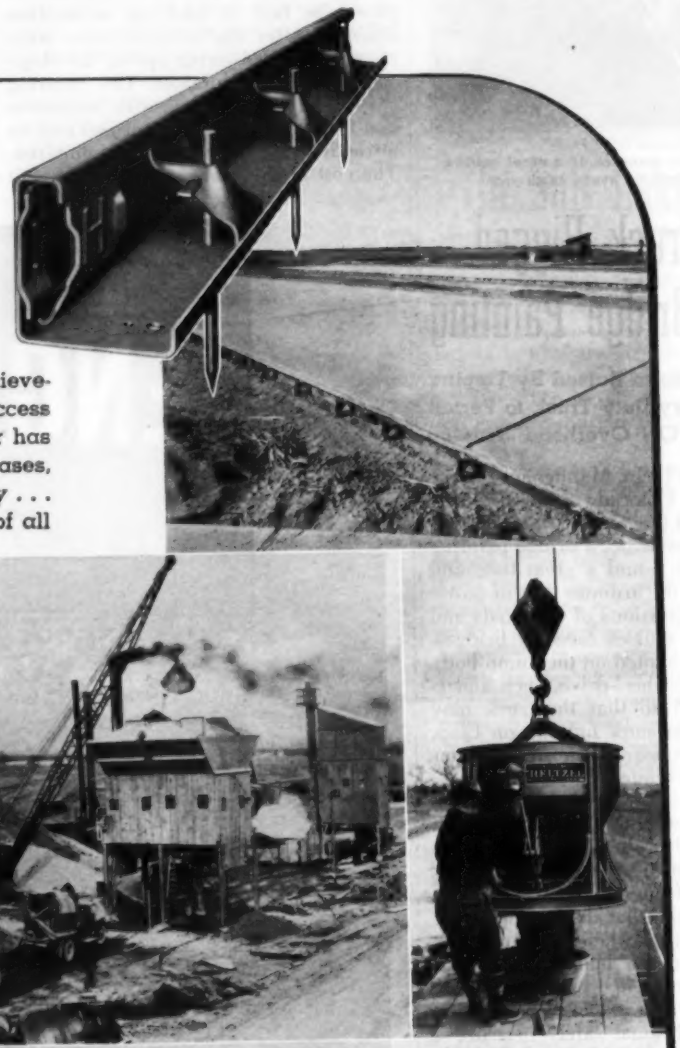
He doesn't expect any stars . . . few people recognize his achievements, but he and his organization are responsible for the success of our Victory Construction Program. Our *General* Contractor has built the factories, the airports, the training centers, the naval bases, the proving grounds, the arsenals . . . *and built them in a hurry* . . . so America could train and equip the greatest armed forces of all time.

Long ago he learned the value and economy of concrete for vital construction. Long ago he learned the value and economy of Heltzel equipment for batching, forming or placing concrete, and long ago he learned to depend on Distributor Organizations for dependable concrete construction equipment.

Today, with all the restriction orders against construction equipment, he knows his Heltzel distributor can, and will help him get the equipment he needs, and get it in a hurry.

If your project is vital to the war effort, you can depend on your Heltzel representatives to get you the equipment necessary to speed up your forming, batching or placing operations.

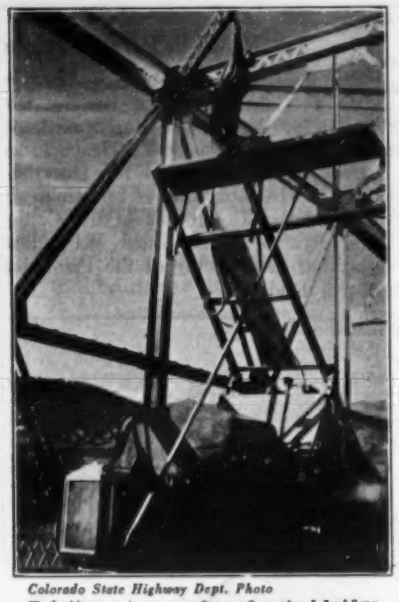
Contact him for complete details.



HELTZEL SUPERIOR CONCRETE CONSTRUCTION EQUIPMENT

MILITARY HIGHWAY FORMS
AIRPORT FORMS
CURB. CURB AND GUTTER OR SIDEWALK FORMS
PORTABLE AGGREGATE BATCHING BINS — 30 TO 100 TONS CAPACITY
PORTABLE AND SEMI PORTABLE BULK CEMENT BATCHING BINS FROM 100 TO 750 BBLS CAP.
CENTRAL MIXING PLANTS
CEMENT TANKS TO 1500 BBLS.
TREMIE CHUTING
CONCRETE FLOOR HOPPERS
CONCRETE BUCKETS

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO · U. S. A.



Colorado State Highway Dept. Photo
Painting a top member of a steel bridge on a Colorado state highway.

Dump Truck Rigged For Bridge Painting

Working Platform Raised By Tipping Body of Heavy-Duty Truck to Permit Easy Work On Overhead Trusses

✦ DEVELOPED in Maintenance Division 2 of the Colorado State Highway Department, at Grand Junction, by Walter Ericson, mechanic, a bridge painting truck has been found a great time and labor saver in the arduous task of painting the upper portions of diagonals and top chords of trusses on steel bridges. The outfit is mounted on the dump body of a Walter all-wheel-drive truck and is easily removed so that the truck may take its place in snow fighting on U. S. 6 and U. S. 50 near the western border of the state in winter.

The platform is 8 feet long and 2 feet wide at the outer end of a pair of 6-inch I-beams pinned in the back of the dump body. The front of the I-beams is firmly attached to a frame at the front of the body so arranged that the I-beams clear the cab of the truck when the dump body is down. When the body is raised to place the platform in working position, the hydraulic valve is locked in position and as an additional safety measure a block of wood is placed between the body frame and the truck frame. The platform is cantilevered to one side which is supported by a 1½-inch pipe sleeved into a 2-inch pipe fastened firmly to the front of the truck when the platform is in use. Along the sides of the platform are angles to serve as toe guards to prevent the man on the platform slipping off when working. The braces between the 6-inch I-beams form a ladder easily climbed by the painter.

A 7-cfm DeVilbiss air compressor is swung on a pivot in the body so that it is always level, no matter what the position of the dump body. It supplies the air for the spray-painting of the structures which were done over with aluminum paint when that was available. A white paint is now used for this maintenance service.

Road Congress Proceedings

The proceedings of the Fourth Pan American Highway Congress, held in Mexico City September 15-24, 1941, have just been published, in Spanish, in three volumes. Information about securing copies of these three volumes may be obtained from Ing. Armando Santacruz, Jr., Secretario General del Congreso, Cuarto Congreso Panamericano de Carreteras, Edificio de la Secretaria de Communicaciones y Obras Publicas, Ciudad de Mexico, D. F.

Maintenance Reduced By Erosion Control

The Indiana State Highway Commission, through its roadside-improvement program, effected a reduction of 85 per cent in maintenance costs on a section of State Road No. 24 west of Huntington. Rains eroded the steep slopes of this section and regularly filled the drainage ditches with mud, creating a generally hazardous condition on the pavement. Maintenance costs for this section of highway had averaged slightly over $1,200 annually for a twelve-year period, when it was made a roadside-improvement project.

The first stage of the treatment was completed late in 1939, when perforated pipe was laid to pick up subsurface drainage after the seepage zones were located. The following spring the slope was mulched and planted. This planting covered the entire slope with vegetation and the eyesore was transformed into an attractive view for the passing motorist. The cost of this work was $1,700, but it has resulted in a saving of $2,000 in maintenance costs in two years. The maintenance costs on the treated section dropped from the 12-year average of $1,200 to only $175 per year. This section is but one of several such projects which have been initiated and completed by the State Highway Commission under the direction of H. J. Schnitzius, Landscape Supervisor.

These are necessary phases of roadside development for wartime. Economical maintenance can be carried out only when there is a completely vegetated right-of-way, 70 per cent of which is outside the pavement. One of the new problems created by the war is the ban on the use of nitrogenous fertilizers. Nitrogen is vital in the growth of grass and does not exist in most of the subsoils along highways. A new plan to use agricultural limestone and a season of leguminous crops to provide the necessary nitrogen for a grass crop the second season is being tried out.

In reporting this work, *Outdoor Indiana* points out that the economies accomplished by roadside development work are little known to the general public, who have been more interested in the tree-planting and the roadside-park program.

A History and Data On Expansion Joints

The new 16-page illustrated catalog of W. R. Meadows, Inc., Elgin, Ill., entitled "Information about SealTight," contains the history of the company since it started on a small scale in 1926, and a statement of its basic policy. Other pages describe SealTight preformed asphalt expansion joints, fibre and preformed cork expansion joints, their installation, list prices, methods of manufacture and a valuable table on transverse expansion joint requirements. The concluding pages cover SealTight joint sealer, crack filler, hot-pour sewer-joint compound and SealTight center strip.

Copies of this catalog will be sent promptly on request to those writing to the manufacturer.

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TUNE IN FRED ALLEN EVERY SUNDAY NIGHT—C

Anti-Diversion Moves Started in 19 States

The need of preserving reduced highway revenues for post-war purposes is giving added impetus to movements for constitutional amendments, already adopted in 14 states, to require that all special highway-user taxes be dedicated to highway purposes, according to the National Highway Users Conference. Legislators are expected to be asked to submit such amendments to the voters in Alabama, Arizona, Arkansas, Connecticut, Delaware, Indiana, Maine, Maryland, Massachusetts, Montana, Nebraska, New York, Oklahoma, Pennsylvania, Rhode Island, Texas (exempting 1 cent of the state gasoline tax now going to schools), Utah, Wisconsin and Wyoming. Highway users are urging the reduction of current diversion of highway funds in a number of other states.

It is regrettable to note that there are threats of increased diversion of highway funds to non-highway purposes in Illinois, New Jersey, Oklahoma and Texas. It is also reported that there is activity in the following states to seek reduction in the gasoline or other highway-user taxes which are now needed more than ever to preserve our highway investment: Arkansas, California, Delaware, Michigan, Montana, New York, Oregon, Pennsylvania, South Dakota and Wisconsin. There are also indications that cities and counties will make new demands for state highway revenues in Arkansas, Connecticut, Illinois, New Mexico, Texas and Winconsin.

Air Hammers and Tampers

The latest bulletins of Dayton Pneumatic Tool Co., P.O. Box 747, Dayton, Ohio, cover its ring valve rammers for backfill tamping, scaling, calking and chipping hammers, and Dayton quick-acting and universal hose couplings for compressed air lines. Bulletins Nos. 100 and 300 cover these fully-designed ring valve tools with hard-chrome-plated cylinder bores and piston rods and may be secured direct from the company.

Congressman Robinson Heads Road Committee

J. W. Robinson, Congressman from Utah, has been named Chairman of the House Roads Committee. He has been a member of this Committee since 1933 and succeeds Oklahoma Representative Wilburn Cartwright, who was not re-elected.

The new Chairman is well-known to members of the highway profession and industry because of his frequent attendance at conventions and meetings of the American Road Builders' Association. He has a genuine interest in road problems in all sections of the country and has made a thorough study of laws and regulations affecting highways, roads and trails of all types. During his ten years on the House Roads Committee, he has helped to draft and pass a great deal of legislation that has been of significant benefit to the national highway system, according to Charles M. Upham, Engineer-Director, American Road Builders' Association.

C. & E. M. Photo
The rotary screen suspended over the 3-compartment bin at the Salt Lake County gravel pit.

Unusual Gravel Plant In Salt Lake County

(*Continued from page* 1)

drier is 7 feet in diameter and 30 feet long and is oil-fired. It delivers the dried aggregate to the hot elevator which is totally enclosed to minimize dust and conserve heat, and thence to the 20-yard hot bin. The 12,000-gallon asphalt storage tank is buried in the hillside. A fuel oil tank for the drier torch is located just above the asphalt tank, and at ground level beneath the plant is a fuel oil pump which delivers the oil under a pressure of 120 pounds to the nozzle of the torch. A horizontal coal-fired steam boiler provides steam for the two heating coils in the asphalt tank, and also for operating the Gardner-Denver steam reciprocating pump which raises the asphalt from the trucks to the storage tank. A small rotary pump driven by a vertical reciprocating steam engine through a belt delivers the hot asphalt from the storage tank to the weigh bucket.

The asphalt-plant pugmill for the 3,300-pound batches is driven by a Waukesha diesel engine. Water for the steam boiler and for cooling the engines is furnished from a small spring from the hillside which is caught in a cistern formed from large sections of concrete pipe on end with holes in the sides and packed with coarse gravel outside.

When operating the crusher and the asphalt plant, a total of about fourteen men is required. The asphalt mix is hauled away by an average fleet of five trucks for a haul of 6 to 7 miles, each truck hauling five batches per trip. The oil mulch is mixed with from 10 to 20 gallons of asphalt per 3,300-pound batch, depending on the fineness of the crusher-run aggregates. J. W. Beardall is Foreman of the crushing and asphalt plants.

The county has six different gravel pits located at convenient points throughout the county for pit-run gravel which is used for 24-foot base courses and 8-foot shoulders. The material is loaded into the fleet of county trucks by a ½-yard Northwest shovel and two Barber-Greene loaders.

Atlas Powder Promotions

Announcement has been made by the Atlas Powder Co., Wilmington, Del., of the appointment of Ralph K. Gottshall of Seattle, Wash., as Director of Sales of Atlas Explosives Department. Mr. Gottshall, who has been Manager of the company's Northwestern District, with offices in Seattle, will now be located at the general offices in Wilmington.

William T. Mahood, of the Contractors Section of the Atlas Explosives Department, has been appointed Manager of the Northwestern District to succeed Mr. Gottshall.

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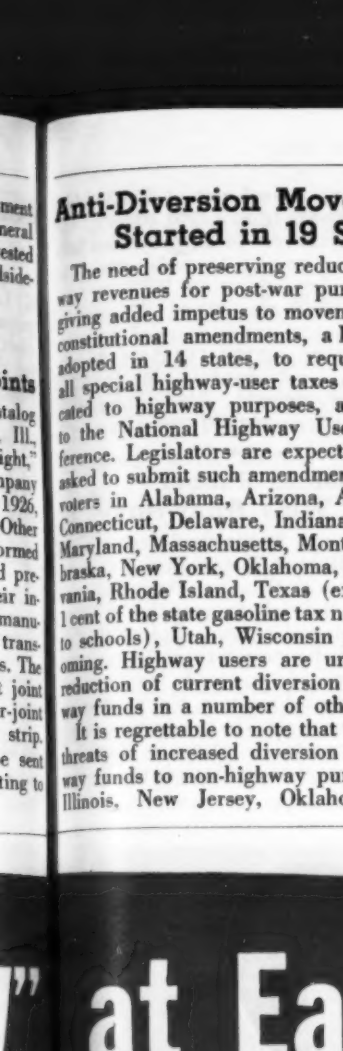

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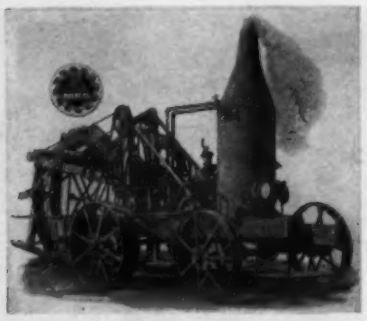
HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY



Then and now: above, one of the first Buckeye ditchers made and, at right, a modern Buckeye Model 410 boom-type trencher.

Buckeye's 50 Years Of Ditcher Building

Fifty years ago the first Buckeye ditcher was built in a tiny shop in Bowling Green, Ohio. James B. Hill, its designer and builder, thus became the founder of the now well-known Buckeye Traction Ditcher Co. of Findlay, Ohio.

This first Buckeye ditcher was of the wheel type, was built without engineering drawings or designs, and sold for $700. All patterns were made of wood and most of them were carved out with a jack knife. The plant was successively moved to Deshler, Carey and finally to Findlay, Ohio, in 1901. In its 50 years of progress, the applications of the Buckeye ditcher have become widely varied. Originally built for laying drain tile on farms, the Buckeye ditcher soon demonstrated its value for digging trench for many other purposes. After the development of the boom-type trencher about 15 years ago, power shovels and road-building machinery were added to the Buckeye line.

Billion Dollar Program Halted by WPB Order

As a result of studies by the Facility Review Committee, established October 23, 1942, WPB in November, December and January last ordered work stopped on construction projects having a total cost of $1,214,850,897, in line with the policy of curtailing non-war work to free materials, equipment and other resources for more essential uses. Many of these projects were halted by the programming agencies, while others were stopped by the War Production Board through revocation of priorities.

Among the types of projects halted were highways, both state and national; bird refuges; fish hatcheries; reclamation projects; power projects, both publicly and privately financed; housing; schools; irrigation; and others which could not meet the test of essentiality.

The greatest savings resulted from the stopping of miscellaneous WPA projects, which, if carried out, would have cost an estimated total of $413,000,000. Power and irrigation projects which would have cost a total of $348,412,577 were stopped, while less essential Army and Navy projects costing $69,772,200 and $113,243,858 respectively were halted. Housing projects, which would have involved a total of $1,370,000, were stopped to conform with revised housing programs.

This reduction in construction, which followed a partial review of the programs of various agencies, was ordered to make way for war production and does not mean that such projects are to be permanently dropped. On the contrary, there will be special need for many such public works in the period following the end of the war to help take up the shock of reverting to peacetime economy.

The table below shows the dollar value of the projects stopped by WPB and the programming agencies, in line with the policy of halting non-war construction between October 23, 1942, and January 15, 1943:

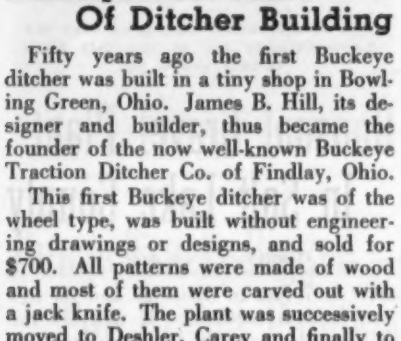
PROJECTS	TOTAL COST
Highways, bridges and tunnels (state and national)	$ 104,968,736
Irrigation and power (public and private)	348,412,577
Agricultural products	2,716,820
Building materials	270,171
Airport facilities and development	23,585,056
Army (miscellaneous projects)	69,772,200
Navy (miscellaneous projects)	113,243,858
WPA (miscellaneous projects)	413,000,000
Transportation	580,000
Bird refuges	2,696,034
Fish hatcheries	451,822
Mining and processing	650,000
Reclamation	129,400,000
Recreation	1,313,000
Schools	2,048,623
Communications	317,000
Housing	1,370,000
Miscellaneous	55,000
*TOTAL	$1,214,850,897

*Does not include the cost of 8 highway projects, 3 agricultural products projects, 2 airport projects, 2 power projects, and 1 bird refuge, for which total costs were not given.

Late in January, the War Production Board announced that additional projects having a total cost of $56,344,612 were stopped, bringing to $1,271,195,509 the total cost of all projects which have been stopped by either the programming agency or the WPB as non-essential to the war effort. The cost of projects which were stopped between January 16 and 22, 1943, included: highways and bridges, $4,340,579; power, $29,833,000; and miscellaneous Army projects, $22,171,033.

Continental Rubber Wins Army-Navy "E"

On January 26 the employees of Continental Rubber Works, Erie, Pa., were presented with the Army-Navy flag, giving them the right to wear the "E" Production Award button. Robert P. Patterson, Under Secretary of War, stated that the award "was made for outstanding accomplishment in the production of war materials. The production standard Continental is setting is inspiring, and will serve as an example to all other Americans."



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Long Access Road To Army Air Base

Reynolds-Ely Const. Co. of Springville, Utah, Used a Traveling Mixer; Oil Mat Topped with Rock Asphalt

♦ ONE of the many air bases located between main highways in the mountain states is being connected from its south gate to both the adjacent Federal highways running to nearby large cities. The contract recently completed by Reynolds-Ely Construction Co., of Springville, Utah, called for the construction of 3.5 miles of 24-foot oil mat 2 inches thick surfaced with 1 inch of rock asphalt and with 8-foot shoulders on either side. Upon completion of this contract, access to this air base will be much easier and faster to accommodate the heavy traffic.

The road had been graded 54 feet wide with a base course of crushed gravel of 2-inch maximum screen size compacted by an 8-ton roller. Top gravel with a maximum 1-inch stone was spread in 1941, and in 1942 was scarified and bladed to one side to produce a windrow equivalent to 220 pounds per square yard of roadway.

Prime and Road-Mix

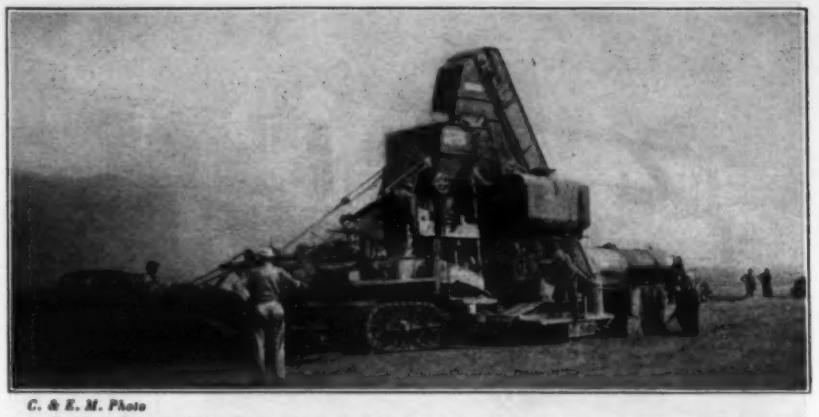
The side of the road opposite the windrow was primed under this contract with SC-1 at 0.25 gallon per square yard 12 feet wide, using a Standard Steel trailer distributor attached to the rear of one of the booster trucks which hauled the asphaltic oil 28 miles from a refinery. The fleet of booster trucks varied in capacity from 1,500 to 3,400 gallons. The prime was allowed to cure, using a slight blotting of fines when it was necessary to start work before the curing was complete.

Using a largest size Barber-Greene traveling plant machine, the contractor then mixed the windrow with SC-3, running about 3,000 feet of windrow in 12 hours of operation of the traveling mixer. The same fleet of booster trucks that furnished the prime was used to feed the asphalt to the pump of the Barber-Greene machine. With the rear conveyor set laterally, the machine delivered the windrow of aggregate mixed with 4 per cent asphalt onto the primed section. Immediately thereafter, the section of the road, 12 feet wide, where the unmixed windrow had been, was primed and the whole was ready for the blade mixing. This was done by two No. 11 Caterpillar power graders which carried the mixed windrow across the road and back four or five times, turning it completely over on each trip. At the end, the windrow was brought to the center of the road and then spread by cutting from both sides with the two graders. The material was then rolled by an 8-ton Buffalo-Springfield tandem roller.

Of considerable interest was the complete lack of coating on much of the 1-inch gravel in the mixture even after the blades had completed their work. After the oil mat had been down and in service for several days, however, the uncoated stones could not be found as they had become coated from the asphalt that had been taken up by the excess of fine material and then transferred to the surface of the larger stones under the kneading action of rubber-tired traffic.

Rock Asphalt

When the laying of the oil mat was completed for the entire length of the job, the surface layer of rock asphalt was spread under a subcontract. The surface of the mat was given a tack coat of RC-4 at 0.15 gallon per square yard and immediately followed by the spreading of the rock asphalt which had been ground to a maximum ½-inch screen size and 3 per cent of water added. The rock asphalt was laid by the Natural Rock Asphalt Co. of Salt Lake City, Utah, using material from its Sunnyside mines 20 miles east of Price, Utah. After the Adnun spreader had laid down the loose material to make the 1-inch compacted surface, the top was rolled at once by an 8-ton tandem roller. No seal was used on the rock-asphalt surface.



C. & E. M. Photo

A Barber-Greene traveling mixer laying the oil-mat base on an access road for an air base in Utah.

Concrete and Asphalt Curb

From the entrance of the air base, in

(*Concluded on page 50*)

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American Cable TRU-LAY Preformed ...is a SAFER ROPE TO HANDLE

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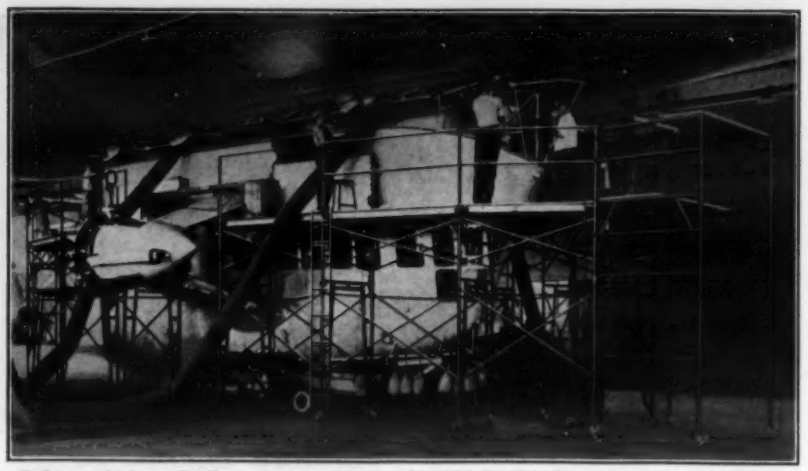

Safway steel scaffolding used in blimp assembly by Goodyear Tire & Rubber Co.

Peacetime Scaffolds In Wartime Service

Portable steel scaffolding, which has replaced the old style wooden-horses-and-planks method and introduced a greater measure of speed, safety and flexibility, is now playing its part in wartime service. According to Goodyear Tire & Rubber Co., the Safway steel scaffolding which they are using is speeding up the assembly of blimps. When a gondola is received, the Safway scaffolding is quickly rolled into position and locked in place by brakes on the casters. Assembly can then begin without delay and when the work is completed, the scaffold is rolled away until another gondola is ready for assembly.

Safway scaffolding is used with marked success for new construction and maintenance work in all types of structures and is made either stationary or portable as conditions demand. Two men can erect 30 vertical feet in 30 minutes, producing a light, strong, safe scaffold insuring sound footing and maximum mobility for workmen at any scaffolding height. Safway accessories include ladders, hoists, ramps, steel rolling and material handling towers. Special forms based on the single unit are also available to meet individual requirements.

The rental or sale of Safway steel scaffolding is subject to maximum price regulation, material conservation and other governmental orders. Further information on the design, construction and adaptability of Safway scaffolding can be obtained from Safway Steel Products, Inc., 6228 W. State St., Milwaukee, Wis., by mentioning this description.

Buy War Bonds regularly.

New Wartime Lights

To meet wartime needs for floodlighting construction jobs, yards and other areas for night work, the Benjamin Electric Mfg. Co., Des Plaines, Ill., has announced the new Type RDS floodlighting projectors. Replacing the Benjamin Type RD projectors, the new seamless steel housing units have all the features of the previous models, with the exception that all parts formerly made of aluminum, brass or other non-ferrous metals are now furnished in steel or cast iron specially treated by porcelain enameling and other rust-proofing to render them resistant to corrosive atmospheric conditions and weathering.

Among the features of the floodlighting projectors are the silvered mirror crystal glass reflector; adjustability of the beam over the entire range from narrow to wide which makes it possible to fit the beam to the requirements of the installation; special focusing mechanism to permit placing the light exactly where needed without waste; easy installation; provisions to facilitate maintenance and lamp changes; and quick-acting safety-type cover clamps.

The new RDS units are furnished in two models: the RDS 14 for 300 and 500-watt general-service lamps or 500-watt floodlighting lamps; and the RDS 18 for 750 and 1,000-watt general-service lamps or 1,000-watt floodlighting lamps. Each model is supplied with plain, stippled or ribbed heat-resisting glass covers.

Further information on these new floodlighting projectors may be secured direct from the manufacturer by referring to this item.

Chicago Rototiller Plant

Rototiller, Inc., Troy, N. Y., has just opened a Chicago factory at 4400 Addison St., Chicago, Ill., for the manufacture of larger Rototiller mixers for soil-cement and bituminous work on road and airport contracts. The first one hundred large-unit Rototillers to be made in this plant will be completed by the end of March.

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Pulsating-Electromagnet

CONCRETE FORM VIBRATORS

Save Concrete— Speed Up Placing and Setting

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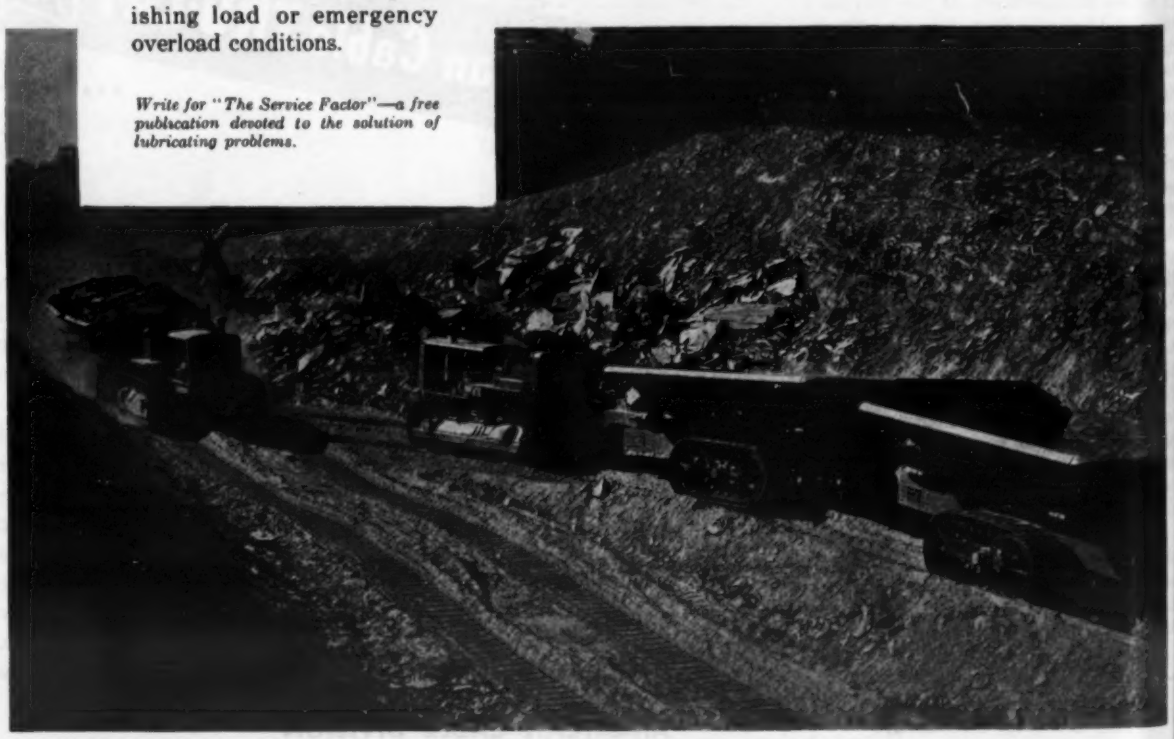

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Concrete Production For Ordnance Igloos

Ample Forms, Good Concrete Organization Speed Pours, Delivered 4,450 Cubic Yards In Two 10-Hour Shifts

(*Photos on page 64*)

WITH standard forms for igloos, the difference in rate of pouring lies entirely with the concreting organization. At a mountain-state Ordnance Depot, being built by lump-sum contract, every man was determined that the best records elsewhere would be bettered on "his job". A thermometer at the entrance to the reservation showed each morning the number of igloos poured the previous day. The goal set was thirty igloos poured complete in two 10-hour shifts in one day. If there was an error of a single igloo indicated on the thermometer, the Area Engineer "heard from" the concrete crews and was asked to correct the mistake.

To perform the feat meant that aggregate production at the crushing plants at the site, cement delivery, batching, batch hauling, mixing in a pair of dual-drum pavers, and delivery to the forms in 2-yard concrete buckets hauled two or three to a truck, had to be synchronized and not one link could be weak or fail. The peak production of concrete at the beginning was set at 4,450 cubic yards, and was reached, but not every day. At the very start, in the first 76 calendar days of operation, the contractor poured 301 floors and 256 barrels of the 800 igloos of 60 and 80-foot lengths to be completed under the original contract.

Aggregate Production

To provide aggregate for the two batching plants supplying the igloo concrete and the one smaller plant for miscellaneous concrete, mostly foundations for warehouses, the contractor installed two Cedarapids crushing and screening plants along the bench which supplied aggregate for all purposes at the reservation. The larger plant for concrete aggregate had a 9 x 36 jaw crusher and 20 x 40 rolls and a 4 x 12-foot vibrating screen. The smaller plant had the same size jaw crusher, 18 x 30 rolls and a 3 x 10-foot vibrating screen. The larger plant was powered by a Murphy diesel engine and the smaller by a Caterpillar diesel.

To supply the gravel to the crushing plants, the contractor used a Bucyrus-Erie 2½-yard shovel and a Northwest shovel with a 2½-yard Amsco bucket in the well-stratified gravel pit. By working the faces to a height of 15 to 18 feet, the gravel was well mixed as to sizes when loaded to the 12 to 14 trucks used under the two shovels. For the Bucyrus-Erie shovel the trucks drove up either side of the shovel and for the Northwest they worked only at one side, somewhat cutting the production of the shovel. The haul to the plants was less than a quarter mile where the trucks dumped over the plant hopper and the feeding was done by hand. The aggregate was unusually clean with practically no organic matter and contained a minimum of clay.

C. & E. M. Photo

A Northwest 2½-yard shovel with an Amsco bucket loading pit-run gravel to an International truck for hauling to the crushing plant producing concrete aggregate.

The Batching Plants

The crushed gravel and the sand were delivered to stockpiles behind the two larger batching plants with the gravel nearer the plants and the sand farther away over a 100-foot tunnel for each plant. The aggregates were kept piled over the tunnel gates by a D8 tractor with a LeTourneau bulldozer. The 24-inch tunnel belt delivered the materials to a 225-foot feeder belt for the larger plant and a 210-foot feeder belt for the other plant. These emptied into the top bins over the weighing batchers.

The smaller plant was a Noble full-automatic batching plant and had a cement silo holding 1,000 sacks, while the other plant, a Johnson full-automatic, had a silo holding 1,500 barrels. A cement shack between the stockpiles and the batching plants had a capacity of 25,000 barrels of cement stored in sacks. The batching plants used about 20 carloads of cement daily, working two 10-hour shifts. The batches consisted of the following dry weights:

(*Continued on page 46*)

WON'T QUIT
or cause time out

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company
32-36 Dey Street
New York, N.Y.

Hayward Buckets

HE KNOWS HIS BUSINESS

Whipsawing a tractor around on the job takes "know-how". It also takes "know-how" to produce friction materials for that tractor which are *correct* and *dependable*.

Raybestos knows how. Thirty-eight years of experience enables Raybestos to service the entire industrial field with a *complete* range of brake linings and frictions, *specially* engineered to meet the *exact* requirements of every make and model of earth mover, excavator, etc.

Raybestos means a single, reliable source of correct and dependable friction materials for every machine and job. And fastest deliveries are assured through your local Raybestos distributor. See him or wire us.

THE RAYBESTOS DIVISION *of Raybestos-Manhattan, Inc.*, BRIDGEPORT, CONN.

RAYBESTOS IS AMERICA'S BIGGEST SELLING BRAKE LINING

Raybestos INDUSTRIAL FRICTION MATERIALS

FOR SHOVELS • CRANES • HOISTS • TRACTORS & EARTH MOVERS

Maintenance a "Must" To Protect Investment

There are 3,995 miles of concrete pavement in the Indiana state highway system today which have been in use for an average of 12.5 years. Of this total there are 1,273 miles which have been in service for more than 15 years, and there are 16 miles which have been in service for more than 25 years. A total of 1,780 miles of concrete highways includes roads 10 to 15 years old. In the past, the average age of retirement for concrete pavement in Indiana has been from 13 to 18 years; hence the State Highway Commission faces the major problem of replacing an extensive mileage of this pavement during the next few years.

The immediate responsibility is preventing, by intensive maintenance and reconstruction, the loss of the $400,000,000 investment which the motorists of Indiana have in their state highway system.

Wide Range Control Of D-C Power Motors

For use where wide speed range or close regulation of direct-current motors is required, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has developed the Rototrol which is described in a new 14-page booklet "A Challenge to Designers of Drive Control". This booklet tells how Rototrol increases the speed range, keeps the speed of a direct-current motor constant regardless of load variations, makes accurate or very close speed regulation possible, gives uniform acceleration and deceleration, and maintains constant horsepower and uniform tension.

Copies of this booklet replete with charts, diagrams and photographs explaining the operation of the Rototrol may be secured from Department 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., by asking for Booklet B-3123 and mentioning this item.

3,000,000

...al of a 20ft highway from

The equal of

San Francisco

HERE is a record to shoot at —3,140,000 tons for the year 1942! This is the production of six Cedarapids Crushing plants operated by the Concrete Materials and Construction Co. of Cedar Rapids, Iowa. Here's the equivalent of 3055 miles of 20 ft. highway from San Francisco to New York, 2½ in. thick — enough stone to pave four Alcan Highways!

Getting things done is what counts today, and out of today's performance comes the guidance to the selection of machinery that is going to assure a successful business tomorrow. Cedarapids Equipment brings you the advantages that will help you meet competition after the "Duration."

Cedarapids plants can be engineered for your aggregate producing needs. From the great Morok Plant (the only plant giving Big Production at low cost that is completely portable) to the smallest screen or crusher, there is Cedarapids equipment that will fit your future plans. Learn about Cedarapids equipment now. Come to Headquarters for aggregate producing equipment.

IOWA MANUFACTURING COMPANY
Cedar Rapids • Iowa

The Wear and Tear Of High-Speed Engines

An article on "Engine Wear" is featured in No. 12 of Vol. 28 of *Lubrication*, a publication of The Texas Company. Engine wear occurring under high-temperature conditions as differentiated from "corrosion wear", or wear occurring under cold running conditions, has been the subject of extensive investigation for many years. This article endeavors to summarize briefly the mechanism by which high-temperature wear occurs and discusses the creation of satisfactory lubricants to minimize operating wear.

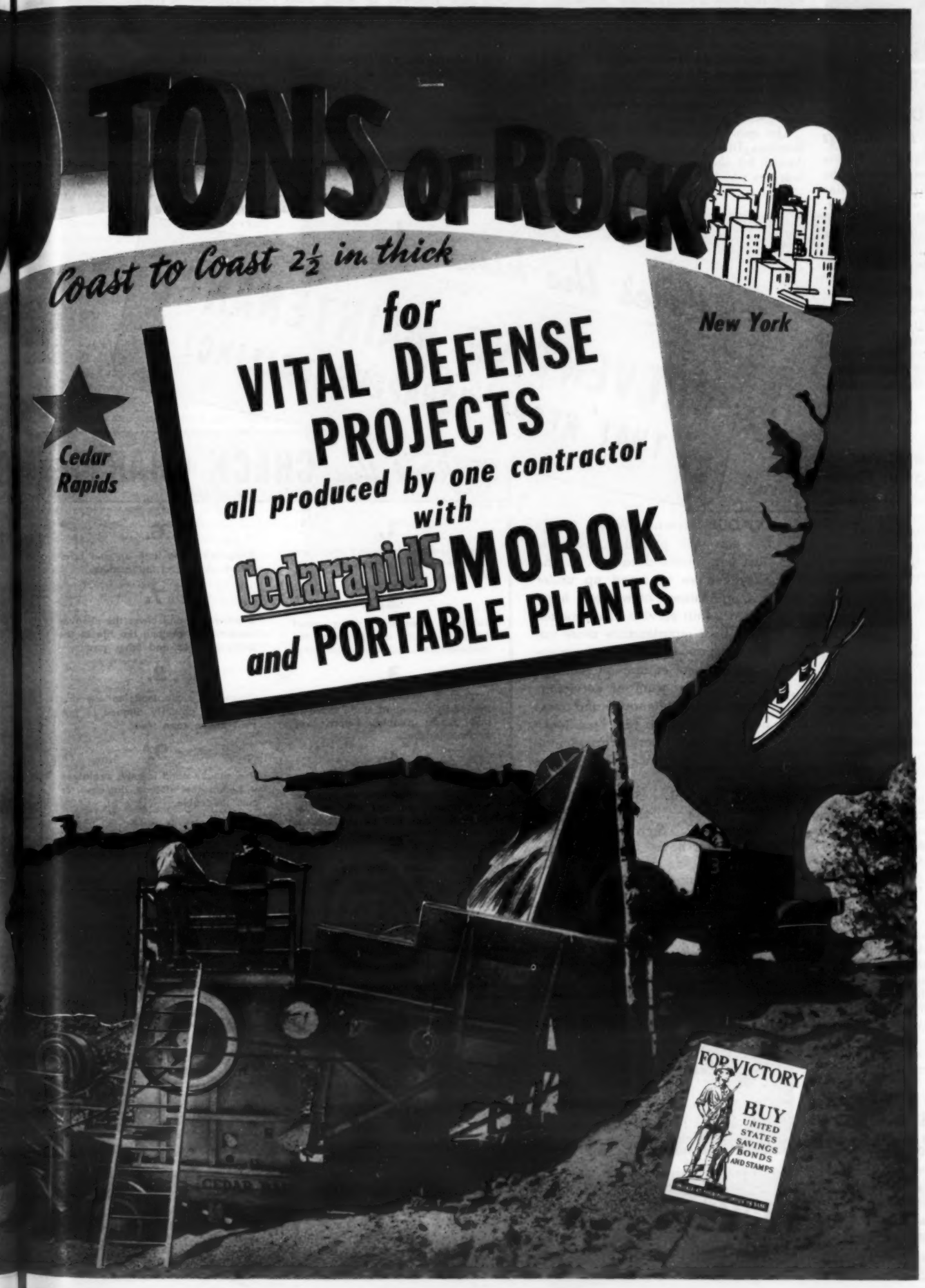
Copies of *Lubrication* will be furnished to readers of CONTRACTORS AND ENGINEERS MONTHLY writing direct to Advertising Division, The Texas Co., 135 E. 42nd St., New York City, and mentioning this review.

Be careful—lost time due to accidents is time working for the enemy.

New ASTM Standards On Mineral Aggregates

The 1942 A.S.T.M. Standards compilation providing specification requirements and widely used test procedures for all kinds of mineral aggregates has recently been published. In addition to requirements on various kinds of concrete aggregates, the standards cover materials for various types of pavements and also bituminous materials. Twenty-five of the standards are specifications, definitions, and recommended practices, while the remaining twenty-two cover methods of sampling and testing.

Copies of this 105-page compilation, developed by the A.S.T.M. Committees C-9 on Concrete and Concrete Aggregates and D-4 on Road and Paving Materials, may be secured direct from the American Society for Testing Materials, 260 So. Broad St., Philadelphia, Pa. Single copies are $1.35 a copy, but on orders for 10 to 49 copies, the price is $1.10 a copy.



Caterpillar's one-cylinder test diesel of yesteryear is cut up for war scrap.

Old Research Diesel Off To War As Scrap

A one-cylinder test engine, used years ago for work in connection with the development of the first Caterpillar diesel engine, has been sent off to war. It was treasured for its historical and sentimental value by research engineers at Caterpillar Tractor Co., Peoria, Ill., but it had a more important function to fill as scrap.

The 3,000-pound machine, called the "rubber engine" because of the elasticity of design which permitted an almost unlimited number of combinations of numerous variable factors to be made, was the granddaddy of the present Caterpillar engine so well known to construction men and now to our Armed Forces on all fighting fronts.

New Carbon Remover Aids in Engine Care

One of the enemies of effective engine performance is carbon. In these days of shortages of mechanics for frequent motor overhauls, of heavy-duty service, and the use of gasoline of lower octane content, the removal of carbon becomes an even greater problem.

As a solution to this engine problem, the Carbo-Flo Mfg. Co., 549 W. Randolph St., Chicago, Ill., has announced a new carbon remover, called Carbo-Flo. This new product is a powder which is fed into the intake while the motor is operating at normal speed and temperature. It burns the carbon off valves, pistons and spark plugs without the necessity of taking the engine apart. According to the producer, the action is immediate, the whole operation taking less than 10 minutes.

In using Carbo-Flo, the engine must be in the open air or connected with an outside exhaust pipe. The engine should be warm before the Carbo-Flo is applied. The air cleaner is removed, the motor idled at about 10 mph, and the Carbo-Flo shaken slowly into the carburetor. When the contents of the container have been fed into the engine, the air cleaner is replaced and the vehicle driven a short distance in second gear. After Carbo-Flo has been used, permanent adjustment may then be made for carburetor, timer and spark plugs. One container of Carbo-Flo is reported to be sufficient to remove all of the carbon from any truck or tractor engine.

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
Write for Job Estimate and Literature
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MACHINERY & EQUIPMENT CO., Inc.
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36-40 11th St., Long Island City, N.Y.
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Army-Navy "E" Awards

Several more manufacturers in the construction equipment field have been given Army-Navy "E" Awards for excellence in production. These include the Anthony Co., Streator, Ill.; Cummins Engine Co., Columbus, Ind.; Hyatt Bearings Div., General Motors Corp., Harrison, N. J.; and Irving Subway Grating Co., Inc., Long Island City, N. Y.

The Award was given to the Anthony Co. for its production of hydraulic hoists and bodies which are working day and night to build military roads, airports, camps and bases around the world. More than 500 Anthony units were used in the construction of the Alcan Highway.

A streamlined between-shifts ceremony marked the presentation of the "E" Award to the Cummins Engine Co. for its production of diesel engines for the fighting fronts.

The men and women of the Hyatt Bearings Division were given the "E" Award for their record production of bearings which are already in action in trucks, ships, tanks, guns, planes and in the machines which make them.

For high achievement in the production of portable airfield mats, the Irving Subway Grating Co., Inc., was presented with the Army-Navy "E" Award. The citation mentioned also the job which this company is doing for the Navy and Merchant Marine.

New Guatemala Road To Help Move Rubber

Deep in the forest of northern Guatemala, a new highway is being built which will help provide an additional supply of rubber for the fighting machines of the United Nations. The completion of this route will improve highway communications into the productive forests of the Department of Peten, the northernmost and largest subdivision of Guatemala, which has a variety of valuable forest products, including precious woods, rubber trees, and chicle trees which yield the white resin from which chewing gum is made.

The construction of the road was begun on the initiative of President Ubico of Guatemala several years before the Americas faced the urgent need of replacing the rubber supplies formerly obtained from Malaya and the Netherlands East Indies. Now new and greater significance is added to the completion of the work.

Guatemala has agreed to cooperate with the United States in increasing rubber production and in the sale of her exportable surplus for use by the United Nations, and a representative of the Rubber Division of the U. S. Board of Economic Warfare has already surveyed the forests of Peten in connection with plans for increasing rubber production.

More than 100 kilometers of the gravel-top highway have already been built to Sebol, from which town river travel is possible to the Peten forests.

We suggest that you keep on file our series of articles on equipment care. They will help you keep your machines working for Victory.

Here's the kind of
PREVENTIVE MAINTENANCE
THAT KEEPS SCRAPERS ROLLING!

YOUR present 4-Wheel Scrapers will probably have to last you for the duration . . . and they'll have to stand up under the punishment of wartime high-speed 3-shift service. That makes the job of maintenance more important than ever before because even the best equipment requires a regular program of servicing, preventive maintenance and overhaul. Here are a few "pointers" to help keep your scrapers rolling at top efficiency!

YOUR International TracTracTor Distributor is equipped to do a service job as never before to help you prolong the useful life of your equipment.

Read this CHECK CHART

1. Check tires regularly and keep them inflated exactly as recommended by the manufacturer.

2. Lubricate regularly using good grade lubricants and following the manufacturer's instructions carefully.

3. Inspection should be regular routine and every effort made to locate and correct troubles before they become serious.

4. Repairs should be made promptly and with special care so that the original strength and efficiency of the entire unit will be maintained.

5. Don't let cutting edges wear down too far or lip castings will be weakened.

6. Keep rub-plates built up and hard-faced to protect lip casting.

7. Disassemble and clean the sheaves regularly to prolong the life of the bearings, pins and other parts.

8. Check all cable leads to see that ropes are properly aligned to prevent undue rope wear.

9. If a sheave-stand is bent, straighten it before the off-lead damages or cuts the cable.

10. Save cable by avoiding unnecessary stress. Do not travel with ejector, apron or bowl hoisted to extreme height.

BUCYRUS ERIE TRACTOR EQUIPMENT
SEE YOUR INTERNATIONAL TRACTRACTOR DISTRIBUTOR

Asphalt Maintenance On Kansas Highways

Sunflower State Faces Difficulties Like the Asphalt Freeze; Chip Seal Operations Continue

✦ WHEN the cold wave of asphalt freezing passed over Kansas in the summer of 1942, orders for all the asphalt needed for construction and maintenance for the year had been placed with the seven asphalt refineries within the state, including one at the Missouri border. Certificates for the release of about 75 per cent of the asphalt required were secured but the Army stepped in and took the entire output of some of the refineries for airport-runway construction at the height of summer maintenance operations. This difficulty was overcome by diverting orders for certified asphalt from one district to another, and one refinery to another, and hauling by tank truck on construction.

As the state owns no fleet of asphalt tank trucks, it was at a disadvantage but secured sufficient delivery by tank cars to take care of the more necessary operations. Fortunately, it has storage tanks scattered over the state for maintenance work so that sporadic tank truck deliveries do not delay maintenance as much as they would on construction.

Most maintenance sealing is done by contract and this year it was greatly delayed as few of the contractors have tank trucks for hauling and railroad deliveries have been very slow.

Type of Highways

The state highways in Kansas comprise a mileage of 9,619.7 which excludes 271.09 miles of connecting links in the state highway system through first and second-class cities where the highways are maintained by the cities which are reimbursed at the rate of $250 per mile per year. Highway mileages by types are:

Unimproved earth	460.8 miles
Improved earth	54.5 miles
Gravel and stone, dry surface	2,334.9 miles
Bituminous surface treatment, penetration on prepared base	321.5 miles
Bituminous surface treatment, penetration without prepared base	2,781.4 miles
Bituminous mix, mat, on prepared base	138.5 miles
Bituminous mix, mat, without prepared base	1,672.2 miles
Bituminous macadam	121.6 miles
Concrete, 2-lane	1,299.3 miles
Brick	141.0 miles
Concrete, 4-lane	38.9 miles
Military roads in reservations, part of the state highway system	10.2 miles
Connecting links within corporate limits of third and fourth-class cities	244.9 miles
Total mileage maintained by the state	9,619.7 miles

Materials Used for Sealing

The oil-mat construction throughout the state varies in thickness from ¾ inch to 3 inches, most of which was mixed by traveling plant mixers and laid by pneumatic-tired patrol graders. This is given a seal coat at intervals of from two to five years, depending on the traffic and the condition of the bases. In the western part of the state where the traffic is light, the seals usually last for five years, while in the eastern section they are worn out in one and a half to two years. On the older roads it is the condition of the bases which controls the life of the seal. All of the newer construction has been placed on bases of selected materials of sufficient strength to insure the life of the mat and seal.

A cut-back asphalt is used in one or two applications for the seal at 0.2 and 0.25 gallon per square yard. On this is spread sand-gravel, crushed stone or chats, using the following specifications:

	Passing ⅜-inch Screen	Passing No. 10 Screen
	(All Figures Are Per Cent)	
Sand-gravel, coarse	1-10	35-45
Sand-gravel, finer	1-20	35-55
Chats	1-10	60-75

Chats, a by-product of mining operations in the zinc and lead fields, are a flinty material coming mostly from the southeastern section of Kansas. It is fairly cheap, costing about 30 cents per ton on the cars, so that freight must be added. The freight costs beyond 100 miles are prohibitive. The material is very uniform and has no fines, making an excellent material for surface seals where the non-skid character of the surface is important.

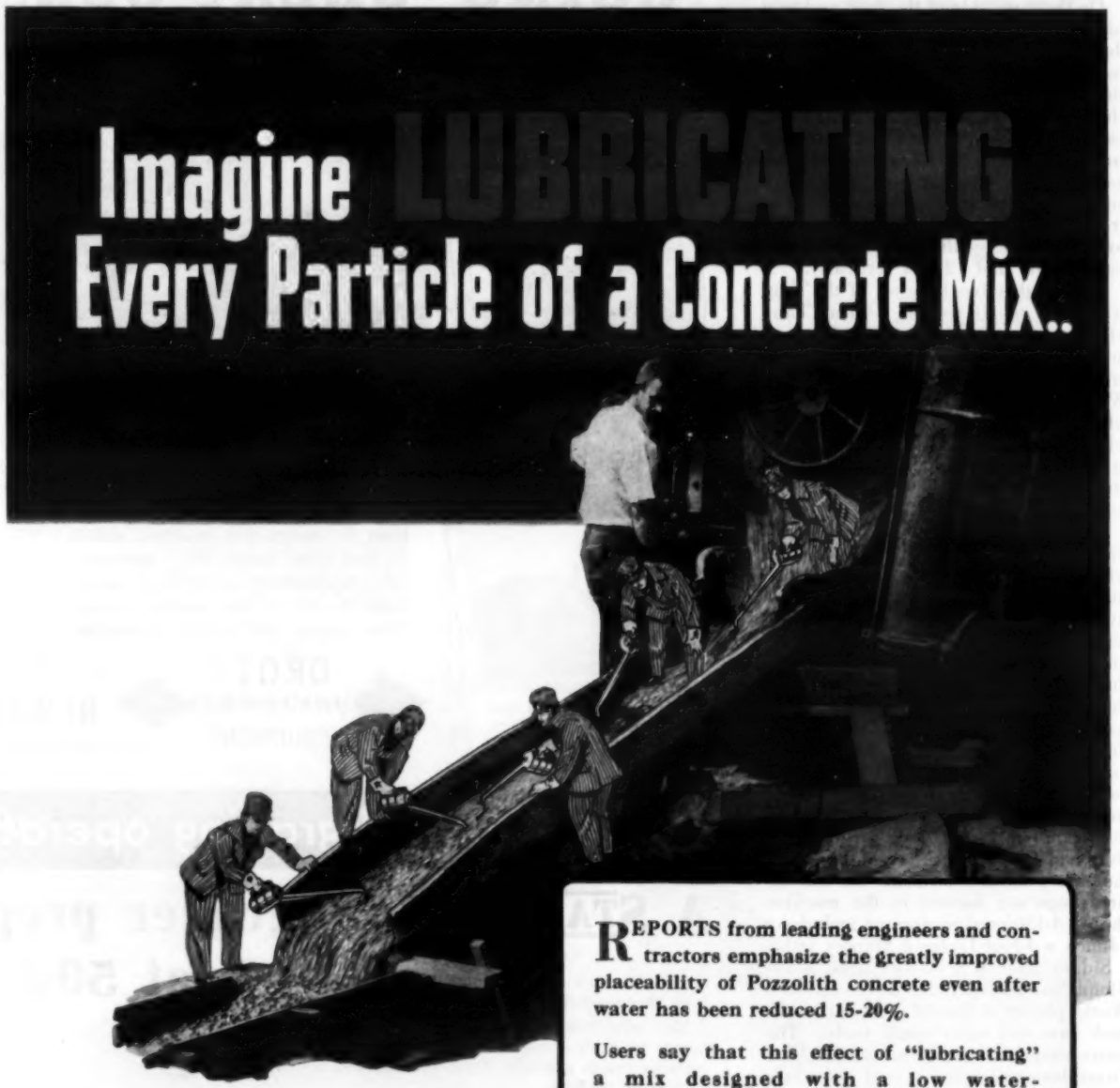
Some crushed rock is used in sealing with the following specifications: passing ¾-inch, 0-3 per cent; passing ⅜-inch, 10-45 per cent; passing No. 8, 65-90 per cent.

Sealing with Cut-Back

Most of the roads on which the sealing is done are from 22 to 30 feet wide. They are cleaned by a power broom or power blower before the sealing is started to insure the absence of fines and dust that will absorb the asphalt and cause a failure of the seal to adhere to the surface. The former specifications called for the application of 0.3 gallon per square yard of the RC-3 or MC-4, depending on the time of year, but this application has been reduced to 0.2 to 0.25 because of the critical situation in the asphalt field. It is felt that, while the

(*Concluded on page 31*)

HOBART ARC WELDING
SAVES TIME; SAVES STEEL
It's becoming more and more a fact that Hobart welders are a big reason for the success of arc welding on many jobs. Advanced design with exclusive Hobart features makes these welders the accepted machine by men who have used all types. Hobart gets the job done right the first time for others and can do the same for you. Write for details today.
Hobart Bros. Co., Box CE-33, Troy, O.
NEW "PRACTIAL ARC WELDING" BOOK on procedures for all types of work. Order yours, only $2.00.
"One of the World's Largest Builders of Arc Welders"



REPORTS from leading engineers and contractors emphasize the greatly improved placeability of Pozzolith concrete even after water has been reduced 15-20%.

Users say that this effect of "lubricating" a mix designed with a low water-cement ratio solves the problem of honeycombing. In addition to easier placing and less man-hours, Pozzolith insures greater watertightness and durability.

Write for complete information on Cement Dispersion and illustrated Pozzolith booklet.

•

THE MASTER BUILDERS CO.
CLEVELAND, OHIO TORONTO, ONTARIO

MASTER BUILDERS

VULCAN TOOLS

A complete line for every type of Rock Drill, Pavement Breaker and Clay Digger.

Vulcan Tool Manufacturing Co.
35-43 Liberty Street, Quincy, Mass.
Branch Offices and Warehouse Stock:
74 Murray St. New York, N. Y.
34 No. Clinton St. Chicago, Ill.

New Enlarged Shops In Salt Lake County

(*Continued from page 1*)

the loud-speaker system.

The shop contains separate sections for the various services needed to maintain the county highway fleet. In one corner is the blacksmith shop, measuring 20 x 30 feet, with a Chambersburg high-frame 20-ton trip hammer, forge, anvil, and a power grinder and buffer. Next to it is the welding shop with a General Electric portable electric welder with a gas-engine drive as well as power hook-up so that it may be taken anywhere in the county for repair operations. A heavy sheet iron table is used by the welders for small jobs and adjacent is a 3-foot diameter exhaust fan to remove welding fumes during the winter when they would be annoying. The bench has a power grinder for finishing welds.

On the same side of the shop and next to the welding shop is a line of heavy-duty metal-top work benches for the mechanics. At the front is the electric shop with a General Electric Tungar charger and an Allen fast charger for batteries, a Weaver headlight tester for county vehicles, an Ekonomist exhaust gas analyzer, wheel-aligning equipment and an Autolite spark-plug cleaner. The front door next to this shop is of the overhead type with 14 feet clearance horizontally and 12 feet vertically.

In the other front corner of the shop is the tire repair section, with a Champion garage compressor for tires and greasing and a Shaler vulcanizer. Out on the floor in front of the tire shop is a Weaver wheel puller for dual pneumatic wheels which saves lifting the heavy wheels, a Graco chassis lubricator and at the back of the shop, having made the circuit, is an Oxweld acetylene generator.

Next to the rear door of the shop is the machine shop, the equipment of which would be a credit to many state highway central shops. It includes a hydraulic press, made in the shop of a heavy welded frame and a hydraulic unit, also produced in the shop; a heavy-duty drill press; a light-duty Craftsman drill press owned by one of the mechanics; a rack with a complete set of twist drills for the large drill press; and a large air compressor driven by an oversize electric motor as it is required to furnish the power for the operation of the steam trip hammer, air for the paint shop and for the machine shop. All of the safety electric switches for the entire shops are located in the machine shop. Additional equipment includes a 14-inch x 4-foot Lodge & Shipley lathe, a Sidney 25-inch x 12-foot lathe, a Le-Blond No. 3 shaper, an American Tool Works planer, a Marvel draw-cut power hack saw and other small tools. The entire shops and garage are heated by a Fitzgibbons-stoker-fired coal boiler through unit heaters in the various sections of the buildings, all automatically controlled by thermostats. A coal bin built outside makes it easy to store 40 tons of coal by simply dumping the trucks over the stoker screw.

At the back of the new building is the sign shop where all the county signs are made from old steel signs or the newer ones of wood. Between the two buildings is a large lavatory and toilet with urinals, toilets, showers and a Bradley Washfountain with four liquid soap dispensers. Adjacent to the lavatory is the grease and oil store room with rectangular tanks and Bowser dispensing pumps. The oil drums are stacked up for ease in drawing off the oil to the dispensing tanks. These are handled by a chain hoist on a monorail. Here a stock of Kelite for cleaning machines is stored.

The stock and parts room is replete with the necessary bins for small parts and materials and with the stock card hung on a nail at the bin for convenience. Everything is issued on requisition. On the mezzanine above the stock room is space for further storage on a heavy floor supported by I-beams.

The new garage has the gasoline dispensing pump located near the rear overhead door with a 6,500-gallon storage tank underground outside the building. This structure is lighted by the newest fluorescent lights while the older building has overhead incandescent lights with reflectors. For the maintenance of these high lights, the county uses the same Chevrolet pick-up truck with an extension ladder that is used for the cleaning and maintenance of the outdoor lighting system on streets in the county outside of the cities. Fluorescent lighting is also used in the stock room which has a full complement of Red Comet automatic fire extinguishers.

C. & E. M. Photo

A heavy-duty drill press and a light Craftsman drill press owned by the mechanic, at right, who is operating it in the Salt Lake County highway garage.

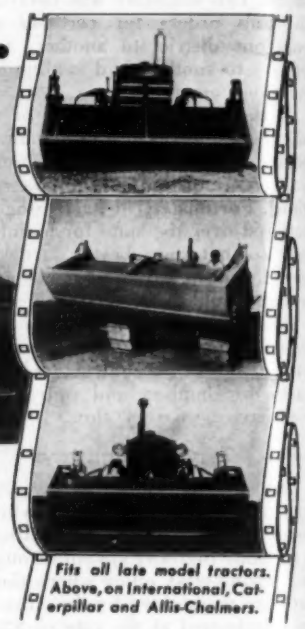
The carpenter shop immediately behind the new garage contains a Badger saw table with 12-inch circular saw, a 12-inch planer, a band saw and a heater made from the rims of old solid tires welded together. The shop is a concrete lean-to, using the rear wall of the

(*Continued on next page*)

GOING "GREAT GUNS"...

Drott Bull Clam Shovel

Raises 3' and tilts right or left to 24° angle — from operator's seat.



Fits all late model tractors. Above, on International, Caterpillar and Allis-Chalmers.

Every report on this outfit — from the front lines, service camps, construction men — is summed up with the statement, "It's going 'great guns'!" Rugged, all-purpose . . . it combines the work of a number of units — shovel, scraper, bulldozer, grader — digs, carries or floats material, dumps it . . . cuts smoothly, spreads evenly. Removes and hauls trees or stumps, big boulders, debris . . . lays pipe, tamps fills — numerous other applications! A variety of sizes — made to fit all late model tractors. Wire, write or call for full information.

- Hydraulically controlled from operator's seat.
- Up to 3' lift above ground — one foot below.
- One to four yards heaped capacity . . . three to twelve thousand pounds lift capacity.
- Raising and lowering of front clam controls cut.
- Regular bucket interchangeable with special snow bucket.

DROTT UNIVERSAL EQUIPMENT

HI-WAY SERVICE CORPORATION

3841 W. WISCONSIN AVE., MILWAUKEE, WIS. • 739 MUNSEY BLDG., WASHINGTON, D. C.

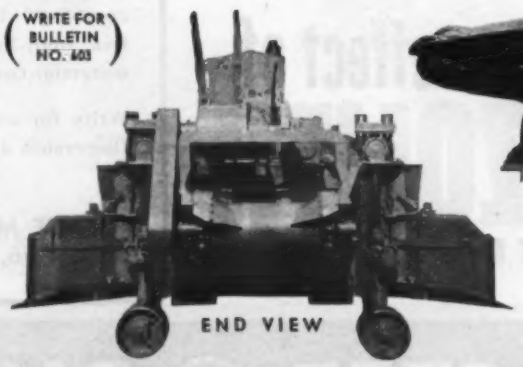
Make YOUR subgrading operations pay a profit:

A STANDARD Subgrader prepares subgrade at 50% to 90% saving!

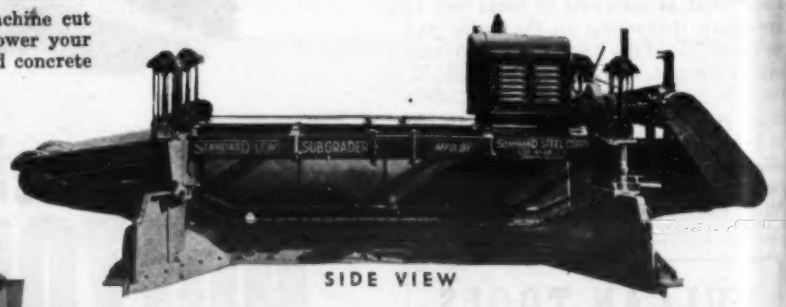
One operator and a helper can prepare subgrade with this machine at the lowest cost ever attained.

Not only does the efficiency of this machine cut down subgrading costs, but it will also lower your costs of rough grading, form setting, and concrete or asphalt placing.

(WRITE FOR BULLETIN NO. 403)



END VIEW



SIDE VIEW

And dollar losses due to voids and improper subgrade will be entirely eliminated.

This machine is building most of the airports in the West.

Detailed records to substantiate this claim are obtainable from contractors using these subgraders. *Write us for further information.*

STANDARD STEEL CORPORATION 5001 So. Boyle Los Angeles

County Maintenance Summer and Winter

(*Continued from preceding page*)

new garage as the front wall of the shop. A 3-ton truck equipped in the shops with a 7-ton power winch is used in the shop to lift heavy objects and was employed to erect the trusses for the new garage. In the field it is used to lift and haul in wrecks, pull and pile stumps, and handle engines in need of repair when it is not necessary to bring the entire machine to the shop.

Organization and Finance

The county government is administered by three commissioners, one elected for four years and the other two for two years, so that elections come every two years. One of the commissioners is in charge of roads, while the entire commission appoints the Superintendent of the Road and Bridge Department. There is no limit to the term of the Superintendent and he can be dismissed at any time. The present Superintendent, George B. Catmull, has held this appointive position for seven years. The Commissioner of Roads, J. R. Mullins, has been an active road contractor for over thirty years, and has served the county consecutively as Road Commissioner for the past seven years.

The county highway budget for 1942 was $341,000 which came from a real estate tax and money returned by the state from fees received for license plates. Five-sixths of the county highway money comes from the real estate tax while the remainder comes from the license fees. These are returned to the counties by the state on the following proportions: 45 per cent based on the population of the county; 45 per cent based on the county highway mileage; and 10 per cent based on the area of the county. Approximately $800,000 of state license fees each year is distributed by the state to counties and cities.

Roads and Maintenance

Salt Lake County has an area of 762 square miles with a total of 630 miles of county highways which includes no concrete construction. In construction and maintenance, the county uses a total of 400,000 gallons of road oil a year and specializes in a plant-mixed oil mulch for road surfacing. Of the 630 miles of road, 450 miles have been oiled with RC-3 at the rate of 0.7 gallon per square yard, a treatment which lasts about five years before it is necessary to repeat the application. Of the 450 miles, about 125 miles have been surfaced with an oil mulch, the program calling for an additional 12 miles per year. The mulch is sealed with RC-4 at 0.3 gallon per square yard and covered with ⅜-inch gravel at 60 tons per 1,000 gallons of treatment for 24-foot roads. The county uses its two 1,100-gallon Etnyre pressure distributors for all surface treatment and seal work. Most of the county highways are on 66-foot right-of-way, with the minimum being 50 feet.

Details of the oil mulch are given under the section of this article covering the gravel plant and the asphalt plant which are operated together.

Snow in Salt Lake County amounts to an average of 4 feet per year but the serious problems are the drifts which pile up to 12 and 16 feet. These drifts extend for about 100 miles on the highways and provide the major problem of snow removal. The county owns and installs yearly a total of 75 miles of snow fence to control the deposit of snow off the highways and thereby reduce the amount of plowing necessary. When a snow storm starts, the equipment, all of which operates out of the central garage, is placed on the roads when the snow reaches 4 inches in depth and it stays out until the roads are clear and the attendant blow stops. The greatest trouble experienced is the continuous drifting of the dry snow. The roads of the entire county are covered by the snow-plowing operations and are gone over at least twice before the plows are called in after the storm. In the winter of 1937, the equipment stayed out on the road for a continuous period of five weeks night and day because the wind continued for the entire time.

The equipment used for snow plowing consists of: fourteen trucks, twelve of which are 3 to 5-ton machines equipped with 2-way Wausau plows, and two 2-ton trucks equipped with 2-way plows of smaller size. The five Austin-Western and one Galion power graders are used effectively with Austin-Western V-plows for snow removal. The county owns one Snogo for attacking drifts which have stumped the other plowing equipment. The county tractor fleet is also used for snow plowing with both V and straight reversible blade plows. An RD7 tractor and a Caterpillar Fifty with V-plows and a Cletrac 96-hp tractor and a new International TD-14 with straight blade plows add much to the effectiveness of the plowing operations.

Late summer and autumn maintenance of the highways includes weed mowing with the county's three mowers, a Minneapolis-Moline towed mower, an International tractor with an International mower, and a J. I. Case machine.

Miscellaneous Services

In addition to placing over 100,000 cubic yards of crushed gravel from its own crushing plant on county roads, much work is done for cities and towns within the county on a cost basis.

County forces have collected scrap donated by the citizens from all over the county, hauled it to the county yard and sorted it into copper, brass, cast iron, and steel and sold it at advantageous prices, bringing in over $1,700

(*Concluded on page 62*)

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Patent instant gear change and positive internal brake that never fails, and will lock load.

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5-Ton 4, & 24 to 1	110 lb.	$ 75
15-Ton 4, 19 & 109 to 1	680 lb.	$250

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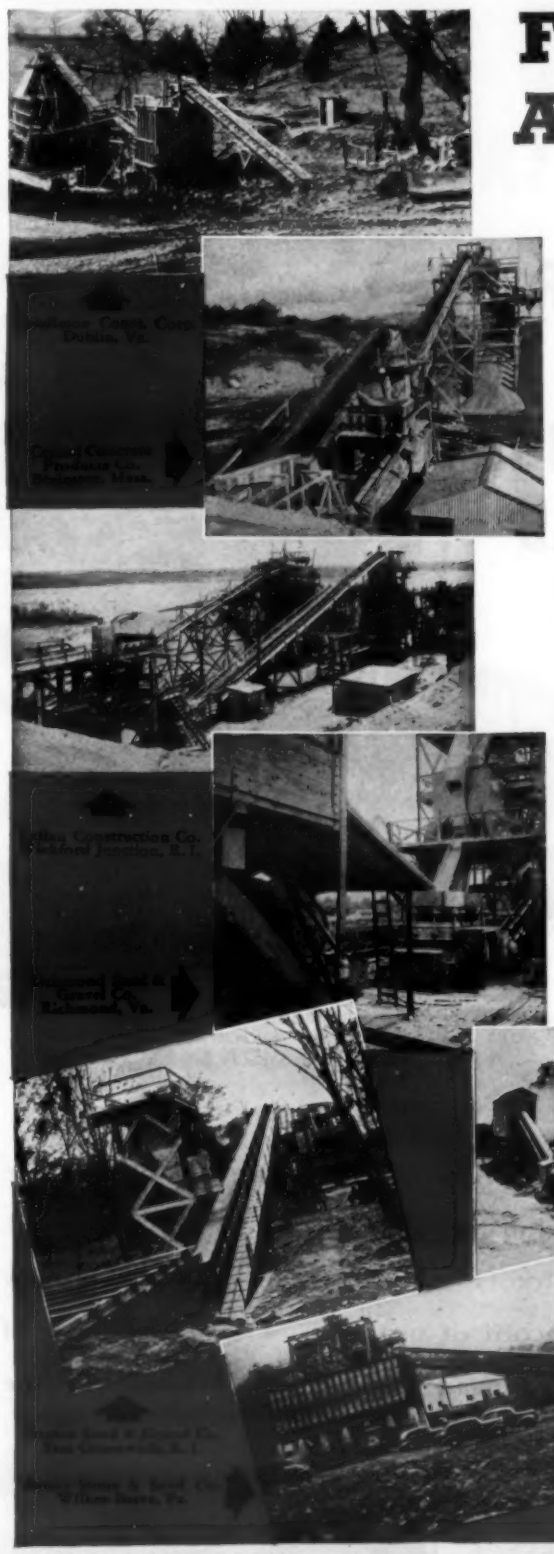

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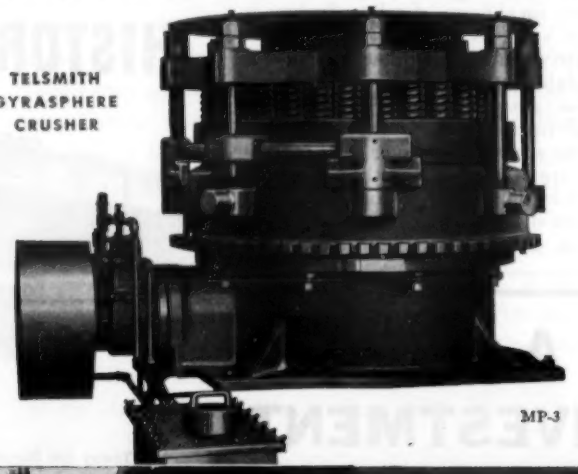
TELSMITH GYRASPHERE CRUSHER



MP-3

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A portion of the Davison Limited Highway in Detroit. Planned before the war, construction was rushed to completion because of the highway's value to war workers.

New Urban Highway A Symbol of Future

The Davison Limited Highway, built for the Board of Wayne County Road Commissioners, Michigan, and opened to traffic late in 1942, takes its place among the pioneer roads of the world and points prophetically to the highways of the post-war period. The Davison project is unusual in that it provides non-stop highway travel directly through a solidly built-up and long-established neighborhood.

This highway was planned long before the start of the war to break the bottle-neck on Davison and on the seven arteries which carry the bulk of Detroit traffic to and from the north, and construction was started before this county was involved in war. Because of its vital value to the many war industries in the neighborhood and to distant industries, the project was granted high priority ratings by the Federal Government and was rushed to completion several months ahead of schedule.

Depressed from 12 to 17 feet below ground level, the central part of the roadway provides for three lanes of traffic in each direction. Opposing traffic is separated by means of a 6-foot wide dividing strip which will be planted with low shrubbery. Each traffic lane is 11 feet wide, to provide an extra foot for safety, and the pavement is of 10-inch plain concrete.

Cross streets are carried over the central roadway by seven rigid-frame concrete structures. Four of the overpasses are of single span, while the other three, which carry street-car lines, are of two-span design. The structures are as wide as, or wider than, the streets approaching them. U-turns from the ground-level service drives can be made on the overpasses without interfering with through traffic, for the turning lanes are separated from the roadway by means of low safety islands aligned with the sidewalks on the overpass approaches.

The depressed roadway is bordered by sodded slopes which will be landscaped. Service drives for local traffic flank the slopes. The service drive to the north utilizes the original Davison route. Right-of-way for the project was obtained by acquiring property on the south side of Davison only and from the original property line back to the alley. Thus, a 205-foot wide right-of-way was obtained with a minimum damage to property.

To preserve the limited-access characteristics of the central highway, entrance is gained only at each end, with the relatively small amount of local traffic confined to the ground-level service drives. However, a bus passenger interchange has been provided at the Woodward Avenue overpass. There the central roadway has been widened one traffic lane on each side for bus stops. The space was provided by substituting retaining walls for the slopes. Sidewalks pass under the overpass and stairways are located at its four corners.

Want information? Write the Editor.

A Concrete Densifier

A powder which is added as an admixture to concrete in the ratio of 1 pound per bag of cement to improve the quality of the concrete and to eliminate honeycombing and faulty construction joints has been developed by Sika, Inc., 35 Gregory Ave., Passaic, N. J. This powder, Plastiment, increases the plasticity and workability of the mix, its impermeability and also the bond between the concrete and the reinforcing steel.

Addition of this small amount of Plastiment enables the concrete crew to prepare the mix with 8 to 15 per cent less water and yet not lose any plasticity or workability, according to the producer. It is reported that it also increases the strength of concrete of the same plasticity as much as 30 per cent.

The details of the use of Plastiment as well as data on Sika integral waterproofing compounds are given in detail in a new bulletin "Structural Waterproofing Compounds" which may be secured direct from the manufacturer.

A GOOD INVESTMENT

The Burch FORCE FEED SPREADER will pay for itself in a very short time in the saving of material and man hours. In addition to that, it will do a job that is unsurpassed. There are many features found only on the BURCH.

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Burch Equipment since 1875.

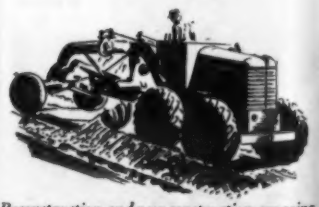
BUY WAR BONDS AND STAMPS

ANOTHER GREAT CHAPTER IN RAILROAD HISTORY

Here Currier and Ives, the famous portrayers of American life in the past century, picture their idea of the ultimate in convenient travel —a train of the 70's rolling through the cut outside Jersey City.

Today GM Diesel Locomotives *speed passengers from Chicago to Los Angeles, 2227 miles, in 41¼ hours, a business-day faster than in the middle nineteen thirties. In recent war emergencies GM freight locomotives on the Santa Fe have been an important factor in the rapid movement of precious war material between Chicago and the Pacific Coast.*

THE history of America is a history of progress in transportation. ★ This history is not completed. ★ General Motors locomotives have turned a new page in this record of progress. ★ The flowering of this new era when peace again returns is foretold in the tremendous strides already taken in meeting the challenges of war today.



Reconstruction and new construction are going to need plenty of this hard-hitting, easy-on-the-fuel power. With normal refinement and development speeded up by war, with production expanded, GM Diesels will be ready to serve in more fields and in more ways than ever.

GM GENERAL MOTORS DIESEL POWER

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ENGINES . . . . 45 to 250 H.P. . . . . DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.

Shooting the "Alcan" From Jeep and Plane

Equipment Representative Relates Experiences Making Color Movies for Engineer School at Fort Belvoir, Va.

(*Photo on page* 64)

✦ THE Alcan Highway, which was opened to the Fairbanks freighters on November 20, 1942, from Dawson Creek, British Columbia, to Fairbanks, Alaska, is a 1,570-mile road built in a little over six months' time. American taxpayers who are paying for this road need never worry about the money being well spent. Our civilian Douglas pilots, our ferry pilots, and last but not least our fighter and bomber pilots, have at some time in their conversations breathed a prayer of thankfulness for the Alcan Highway. This highway provides the one and only landmark in a vast wilderness over which they all will fly with increasing regularity. It also guarantees landing strips and plenty of fuel and well-manned airports. This winter, thousands of tons of "what it takes" will move over this road to its proper destination. Some summer, not too far removed, we hope that you and I will call on our good neighbors to the north while en route with our families to that legendary land —Alaska.

L. K. Bliss, District Representative, Willamette Hyster Co., spent from March, 1942, through June, 1942, on the Alcan Highway, helping to mount Hyster winches on D8 tractors, with the temperature running from zero to 35 degrees below. Having taken a modest footage of Kodachrome movies of the job from Fort St. John to Fort Nelson, British Columbia, and also north of Nelson as far as the job then extended, he was asked by the Engineer School at Fort Belvoir, Va., where the Engineer Board saw these movies, to return to the highway and secure a more complete motion picture story of the job in color.

Arriving at Fort St. John, B. C., he was provided with a jeep and a driver, Private Lopez, by Colonel R. D. Ingalls. They left Fort St. John on the morning of September 22, exposed some film during the day, and arrived at Fort Nelson the same evening. This was an uneventful trip over what was for the most part a fairly high-speed gravel road.

Travel by Jeep

The next morning, September 23, it was learned that one of the Bush pilots, employed by the U. S. Engineers, was flying freight between Fort Nelson and the Liard River. It looked like a good chance to get some aerial shots of the road, but such was not the case. The weather closed down and precluded flying, so on the following day the trip westward was resumed with the jeep, reaching Poncho Lake the first evening out of Nelson.

Mr. Bliss reports, "This trip was slightly more eventful and included, besides taking pictures, getting a nice scalp wound from being thrown into the top of the jeep. We hit an open stream that couldn't be seen at night, causing the jolt, but one of the medical officers at Poncho Lake fixed my scalp wound and did a good job.

"The next day we started out again and made the Liard River Camp at Mile 210 out of Nelson. What with road improvements and considerable construction over this section, the trip was a bit on the rough side.

The rescue of a supply train by a Hyster-equipped Caterpillar on the Alcan Highway.

We Take to the Air

"The following day, I had an opportunity to get aerial views and how! Page

(*Continued on page* 34)

TIPS to Help You Make Your ATHEY FORGED-TRAK TRAILERS LAST LONGER

Follow These Simple Rules

Grease and lubricate wheels after each 8 hours' operation

Check wheels regularly—oil seals; alignment; bearing cages

Keep track plate bolts tight

Track rails can be built up by welding

Wheels can be rebuilt by welding material on rims

Track hooks and pads can be built up, thus restoring arch in track assembly

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To make your construction equipment serve as long as you can is one of today's chief problems. Because of its part in essential Victory construction work, your equipment is vital to winning the War. That's why good care today is more important than ever before. You can extend the life of your Athey Trailers by following a few simple rules. (1) Inspect and lubricate them as recommended in your instruction book, (2) recondition them promptly when they show signs of wear. Let your Athey-"Caterpillar" Dealer help you take better care of your Athey Trailers. He is well equipped to serve you. For more detailed facts on field repairs send for our bulletin "Field Reconditioning of Forged-Trak Wheels". Write Athey Truss Wheel Co., 5631 West 65th Street, Chicago, Illinois.

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Athey products are busily engaged, in this country and abroad, building airports, military and access roads, landing fields, other war construction projects. They're hauling heavy machinery in the oilfields—moving unprecedented loads of logs to the mill—toting material and supplies through untamed underbrush in isolated outposts—speeding iron ore for steel production—serving with the combat engineers.

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GATKE CORPORATION
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Base Stabilization On New Mexico Road

(*Continued from page 2*)

of crushed gravel with maximum ¾-inch stone and was laid over the ballast course with the same 6-inch crown in 42 feet. The top 1 inch of the 4-inch course was processed with MC-3 asphaltic road oil, not as a mat, but rather to stabilize it and add to the life of the seal coat placed later. The stabilized top layer acted as a prime and greatly strengthened the surface of the highway.

The base-course material was specified to have a plasticity index of not more than 6. When strengthening an existing base course, the material was windrowed down the middle of the road in the proper quantity and then just a sufficient amount of this material for the 1-inch stabilized top was bladed to the side. The remainder was spread and rolled to maximum compaction. The same method was used for building the full 4-inch base course, saving out the material for the processing.

When processing was about to start, the windrow at the side was bladed to the center of the highway and then split into two smaller windrows about 10 feet apart. The processed portion of the base was used to cover the roadway to a width of 28 feet and was stabilized with MC-3 at about ⅜ gallon per square yard or roughly 4 per cent asphalt.

The asphalt was applied at the prescribed rate between the split windrows by a 1,000-gallon Etnyre distributor using a 10-foot spray bar, covering about 1 mile as a unit of operation, with booster trucks to supply the distributor. The actual rate of application as figured for the distributor operator was 2.33 gallon per linear foot of travel. The two small windrows were immediately turned in by a pair of Caterpillar No. 12 power graders so that the gravel and asphalt were in a single windrow down the center of the road. The mixing was started by a single Caterpillar No. 12, while the two others followed the distributor closely to fold in the asphalt. Then two of the machines working en echelon rolled the windrow back and forth over the roadway, picking up loose gravel as necessary where the material seemed "fat", until it was

C. & E. M. Photos

On left, a pair of Caterpillar No. 12 power graders folding in the asphalt immediately behind the distributor. At right, a single grader makes the first turn-over of asphalt and gravel on U. S. 85 in New Mexico.

completely mixed and ready to spread.

Following spreading, the mix was compacted by an 8-ton Buffalo-Springfield roller. If the material had been spread too wide, it was kicked back by a rotary broom. During rolling, a broom drag was used to aid in spreading the loose material so as to incorporate it in the stabilized section.

Project in General

Contour ditches were used at the top of all cut slopes to reduce the chance of erosion of the cuts. This is a new type of top surface drainage ditch somewhat flatter in slope than those usually employed for this purpose. It is predicated on the work of the Soil Conservation Service of the Department of Agriculture, under the direction of Dr. H. H. Bennett. The contour ditch prevents soil erosion by holding the water in the ditch and letting it percolate into the ground rather than running over the surface and creating gullies. The use of this principle should be followed to a greater degree by all states in the protection of cut slopes.

On this project both reinforced and unreinforced-concrete culvert pipe were used. When the former became unavailable because of the restrictions on the use of reinforcing, the latter was used. The unreinforced 24-inch culvert pipe of standard strength has a 4½-inch shell.

In the care of the roadside feature of the projects, the Highway Department has done well with the types of shrubs and trees native to the state. As many piñon trees as possibly could be protected and spared during grading operations were left on the slopes, but none on the shoulders where they would be potential hazards. Some cedar, also indigenous to New Mexico, were left on the slopes, adding much to their appearance. The slopes were seeded with grass and sweet clover which does not grow in such profusion as in some of the more humid states. A natural ground cover will gradually establish itself as has occurred on other projects.

This work was done under the direction of B. G. Dwyre and F. G. Healy, State Highway Engineer and Assistant State Highway Engineer, respectively, New Mexico State Highway Department.

Revised Handbook of Arc Welding Standards

The National Electrical Manufacturers Association has announced the publication of a new handbook, "Electric Arc Welding Machine and Electrode Standards", Publication No. 42-81. This represents a complete revision of and replaces No. 36-37, issued in 1936.

The new material in the book covers standards for both d-c and a-c welders. Changes and additions to previously published a-c and d-c data are also included. A feature of the new edition is the segregation of standards for electrodes and a table for two-color markings for heavy-coated ferrous electrode identification.

The new handbook may be secured at a cost of 75 cents, by writing to the National Electrical Manufacturers Assn., Engineering Dept., 155 East 44th St., New York City.

30,000 GPH Carver Model A-4922 on a Mississippi waterfront job.

1 Lifetime Seal—Keeps water in and air out—for good! Wearing surfaces made of Tungsten Carbide—so hard it will cut glass!

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GEORGE HAISS MFG. CO., INC., CANAL PL. & E. 142nd ST., NEW YORK

Hole-Digging Unit Features Texas Job

Baker Bros. Wins Award For Handling of Roadside Development Contract for Texas Highway Dept.

(*Photo on page* 64)

THE roadside development contract for work on which Baker Bros. Co. of Fort Worth, Texas, received the Southern Section Award in CONTRACTORS AND ENGINEERS MONTHLY's 1941-42 Roadside Development Awards, was located on U. S. 81 in Comal County, Texas, and consisted of planting 807 trees and 2,771 shrubs, grading and improving two roadside parks, and placing of sod along 19.957 miles of highway, at a contract price of $13,601.31.

The Texas Highway Department, in nominating Baker Bros. for one of the Awards, stated that this contractor carried on the work in so efficient a manner that the job was completed in 39 of the 75 working days permitted under the contract. Mr. Bob Baker, Superintendent on the project, was particularly cooperative with the Highway Department engineer and inspectors, and throughout the job showed definite interest in producing quality work.

Hole-Digging Unit

Of particular value in expediting the work was the use of a hole-digging machine designed and built by the contractor. The principle by which this machine operates is not new, as utility companies have used similar hole diggers for some time, but Mr. Baker has enlarged and strengthened the unit to meet the requirements of roadside-development work and provide larger blades. The unit, consisting essentially of a horizontal rotary disk with blades which may be raised and lowered by means of a sliding vertical shaft, is mounted on and operated by a McCormick-Deering Farmall tractor. Three sizes of interchangeable circular disks with detachable blades are provided. A 10-inch blade was used for digging holes for the 175 guard posts in the park areas on this job. Approximately 35 such holes were dug in an hour. For digging small shrub holes 24 inches deep, a 20-inch blade was used, digging at the rate of 30 holes an hour. The large 30-inch blade was used extensively on this contract for digging the holes for large shrubs and trees. Where the plans required a hole of 54 inches in diameter and 30 inches deep, the machine dug a 30-inch hole to a depth of 48 inches and then the hole was quickly and easily enlarged with a hand shovel. Twelve such holes were dug in an hour.

This machine operates well in any good loam, or even in clay and gravelly soil, but cannot be used in rocky soils or hard shales. It works most efficiently in large planting areas where moving from one hole to another requires little time. This Texas job was the first large contract on which the machine was used, and certain minor defects showed up but were eliminated after short delays. In one day's test, the machine with a single operator completed more holes than did a gang of 10 laborers. The contractor reports that the unit cost of digging holes with this machine is approximately one-half that of hand digging where labor is paid 40 cents an hour.

Sodding

The sodding items on this roadside-development job, representing 35 per cent of the contract, involved a number of problems for the contractor. To meet the various erosion-control and ground-cover needs, spot sodding of Bermuda grass was used on level fertile soils; mulch sod (loam soil with Bermuda grass) was applied to the infertile soils and rocky areas; Bermuda block sodding (solid sod) was used on steep slopes; and mesquite grass block sodding was applied where farmers desired protection against the encroachment of Bermuda grass into cultivated fields.

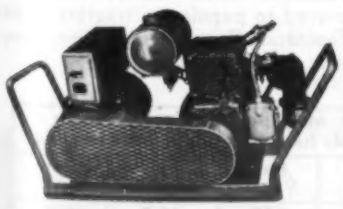
The mulch sodding was excavated and loaded by a dragline. The block sod was cut by an efficient sod cutter attached to a Farmall A tractor, which cut under and on the two sides of a 12-inch strip. A revolving drum with attached blades made the transverse cuts. Efficient loading, hauling and placing of the sod blocks added further to the effectiveness of this part of the work.

History of Company

Baker Bros. Co., contractor for this roadside-development project, was established as a nursery in 1884 by Wil-

(*Concluded on page* 40)

A rear view of Baker Bros. hole-digging machine.



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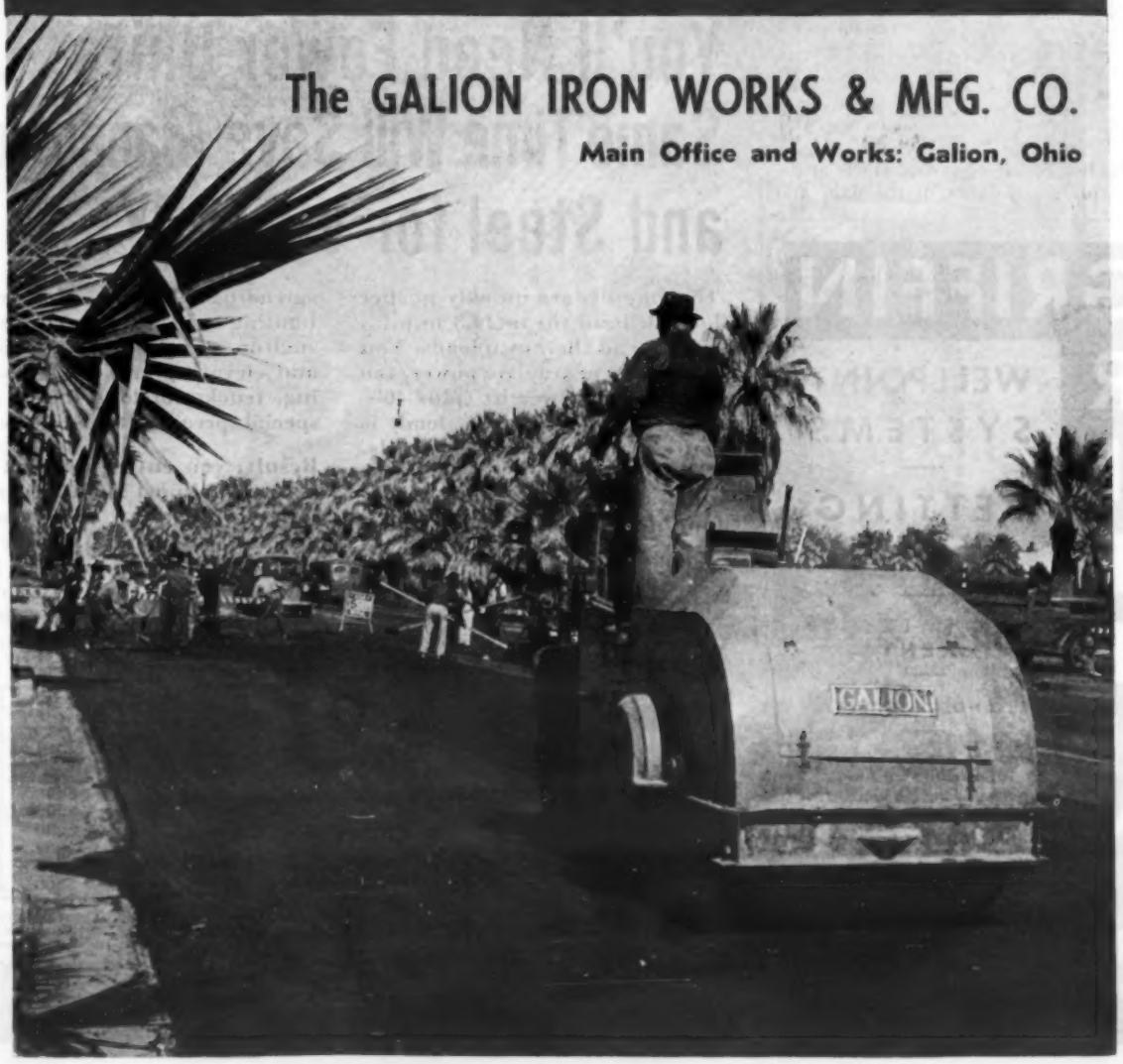

The GALION IRON WORKS & MFG. CO.

Main Office and Works: Galion, Ohio

A 2-Mile Conveyor For Huge Earth Dam

To Move the Material for Anderson Ranch Dam, MSTW, Contractors, Used Conveyor To Minimize Man-Power

(*Photos on page 64*)

✦ A $1,000,000 belt conveyor 2 miles long salvaged from Coulee Dam and other sources, using only a small amount of old steel frames and with 1,000,000 board-feet of lumber in the trestles from timber cut on the reservoir site and sawed in the contractors' mill, was designed to build Anderson Ranch Dam in southwestern Idaho with a minimum of man-power. Every step in the construction and operation of the belt-conveyor system was carefully planned to reduce labor as much as possible and to make the belt fool-proof in operation through multiple safety switches. However, the recent WPB order halting all construction not essential to the war affected this Bureau of Reclamation project, among many others, and all work has stopped.

Because of the efficient operation of this well-designed material-handling system, we are presenting this article, the last in our series on Anderson Ranch Dam, that our readers may benefit from it in handling other long-distance dirt-moving jobs.

The Belt Flights

The following table shows the major features of the belt-conveying system, with the speeds and lengths of the belts as well as their designations:

Belt No.	Tons per hour	Speed fpm	Width	Horizontal Length	Motor hp
Dixie Pit					
Pendulum F	640	400	42 in.	120 ft.	50
Pendulum E	640	400	42 in.	120 ft.	50
Feeder D	640	400	36 in.	100-600 ft.	150
Feeder C	640	400	36 in.	100-600 ft.	150
Main Pit B	1,280	550	42 in.	300-1,600 ft.	150
Stacker A	1,280	550	42 in.	260 ft.	150
Main Haul					
Flight 1	1,280	550	36 in.	1,650 ft.	150
Flight 2	1,280	550	36 in.	1,527 ft.	150
Flight 3	1,280	550	36 in.	1,338 ft.	150
Flight 4	1,280	550	36 in.	758 ft.	150
Flight 5	1,280	550	36 in.	891 ft.	150
Flight 6	1,280	595	36 in.	491 ft.	150
Dam Area					
Flight 7	1,280	550	36 in.	250 ft.	50
Flight 8	1,280	550	36 in.	200 ft.	150
Flight 9	1,280	550	36 in.	150 ft.	150

The belt-conveyor system starts at the Dixie pit downstream of the dam and goes through three tunnels to the dam site. The initial belt is one of two pendulum belts which rotate around the pit belt for a complete 360 degrees in a level plane and has a control house on top of the pendulum turntable. At the receiving end of the pendulum belt a vibrating feeder is used to insure an even feed to the pit belt system.

Stacker A has a drop of 30 feet to a surge pile over a feed hopper delivering to Flight 1 which runs through the first tunnel for a distance of 500 feet. The hopper is equipped with a vibrator to prevent any stoppages and insure an even feed to the main belt system. Flight 1 also runs through the second 500-foot tunnel. There is an open section through a draw between the two tunnels which are 8 x 7 inside.

Flight 2 swings down almost on a catenary on its trestle to avoid a higher trestle than the 100-foot wood structure now installed. One of the photographs shows the detail of construction of the trestle and the idlers. In the erection of the conveyor system, templates were used so as to space the idlers uniformly and electric drills to bore the holes for the heavy screws holding the Link-Belt idlers. The wooden trestles and trusses used for the conveyors were all assembled with Teco connectors to develop the full strength of the timber. Goodyear belting was used throughout the conveyor system.

The transfer from Flight 3 to Flight 4 is a stepped vertical chute, known as a rock transfer station, designed to prevent segregation in a drop of 35 feet from one conveyor to the next. Flight 6 of the system spans the spillway channel with a timber truss 130 feet long so that excavation of the rock in the channel might continue without interference during the operation of the conveyor. Flight 7 has a cantilever projection out over the dam

C. & E. M. Photo

A close-up of the belt on a wood trestle with Teco connectors and Link-Belt idlers for which all bolt holes were bored with jigs.

area. During the construction of the conveyor system, considerable difficulty was experienced in carrying the trestles along

(*Concluded on page 57*)

GRIFFIN

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"GRIFFIN POINTED WELLPOINT FACTS" chock full of latest information on Wellpoint Systems for dewatering, emergency and permanent water supply systems, also information on pressure pumps and data for jetting.

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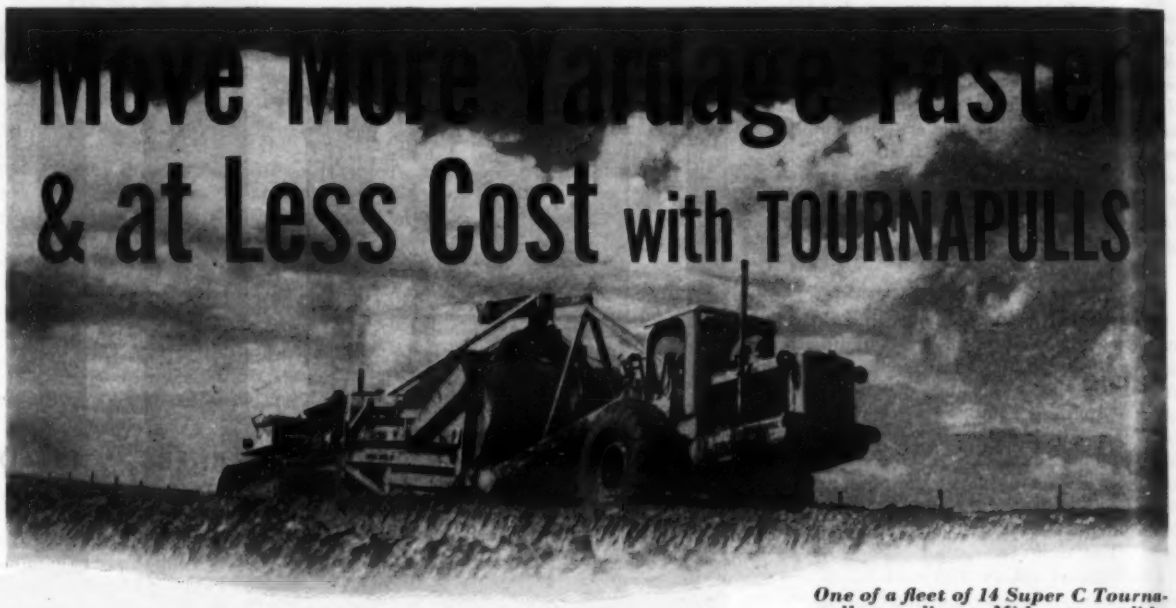


One of a fleet of 14 Super C Tournapulls speeding a Midwestern glider base for Uncle Sam. Contractor is long-time LeTourneau fleet-user J. A. Terteling and Sons. Also on this job are 5 LeTourneau Dozers and 10 Model RU Carryall Scrapers.

You'll Need Fewer Units . . . Same Time Will Save Manpower and Steel for VICTORY

Tournapulls are quickly pusher loaded, haul up to 14.3 m.p.h., and spread their own loads. You get plenty of tractive power, too —Tournapull weight (plus 40% of the Carryall and its load) is centered on the drive wheels. That means surplus rimpull for quick acceleration to top speed or for pulling through tough spots.

Load, Haul, Spread—One Continuous Cycle

With Tournapulls you get tractor-scraper digging and spreading efficiency plus truck hauling speeds. You eliminate such one-purpose tools as shovels and elevating graders for loading, trucks for long hauls, and special spreading tools on the fill.

Result: you cut equipment investment almost in half, require fewer operators, move more yardage (see chart), move it faster, at less cost and with less steel. Consult your LeTourneau-"Caterpillar" dealer NOW for WPB release requirements.

NOTE TO OPERATORS— Tournapulls Are Easy to Handle

Tournapulls are easy to operate—you pull and steer with the same wheels, just as you do with tracks on a track-type tractor. There are no front wheels to bog down when traveling or turning in mud or sand. Two-wheel design enables you to turn faster and sharper. Big brakes on both Tournapull and Carryall Scraper assure quick stopping and complete control on grades. Same fast, sure-acting LeTourneau cable control that has proved so popular on tractors, makes Tournapull-Carryall operation easy, too.

Haul One Way	98 H.P. Model C (11 yards heaped)		150 H.P. Super C (15 yards heaped)	
	Trips	Pay Yards	Trips	Pay Yards
600	17.1	150	15.0	180
1200	14.0	119	12.0	144
1600	12.3	104	10.7	129
2000	10.9	93	9.7	116
3000	8.4	71	7.6	91
5000	5.8	50	5.4	65

These figures are based on a 60-minute hour, loading common earth on the level with a "Caterpillar" D8 pusher and hauling over good roads.

Manufacturers of DOZERS, CARRYALL® SCRAPERS, POWER CONTROL UNITS, ROOTERS®, SHEEP'S FOOT ROLLERS, TOURNAPULLS®, TOURNAROPE®, TOURNATRAILERS®, TOURNAWELD®, TRACTOR CRANES, *Patents Pending

Army-Navy Award for Allis-Chalmers Tractors

The first Army-Navy "E" for excellence in tractor production has been awarded to the Springfield, Ill., plant of the Allis-Chalmers Manufacturing Co. The banner was presented by Colonel John S. Seybold, Chief of Procurement Section, Supply Division Office, Washington, D. C., who emphasized the importance of tractors in mechanized war —"the mule power of today's army". "E" pins were presented to representative Allis-Chalmers employees by Lt. Commander Walter J. Eden, U.S.N.

Almost the entire production of Allis-Chalmers 2-cycle diesel tractors has been used in construction for the U. S. and Allied armed forces since the beginning of the present emergency.

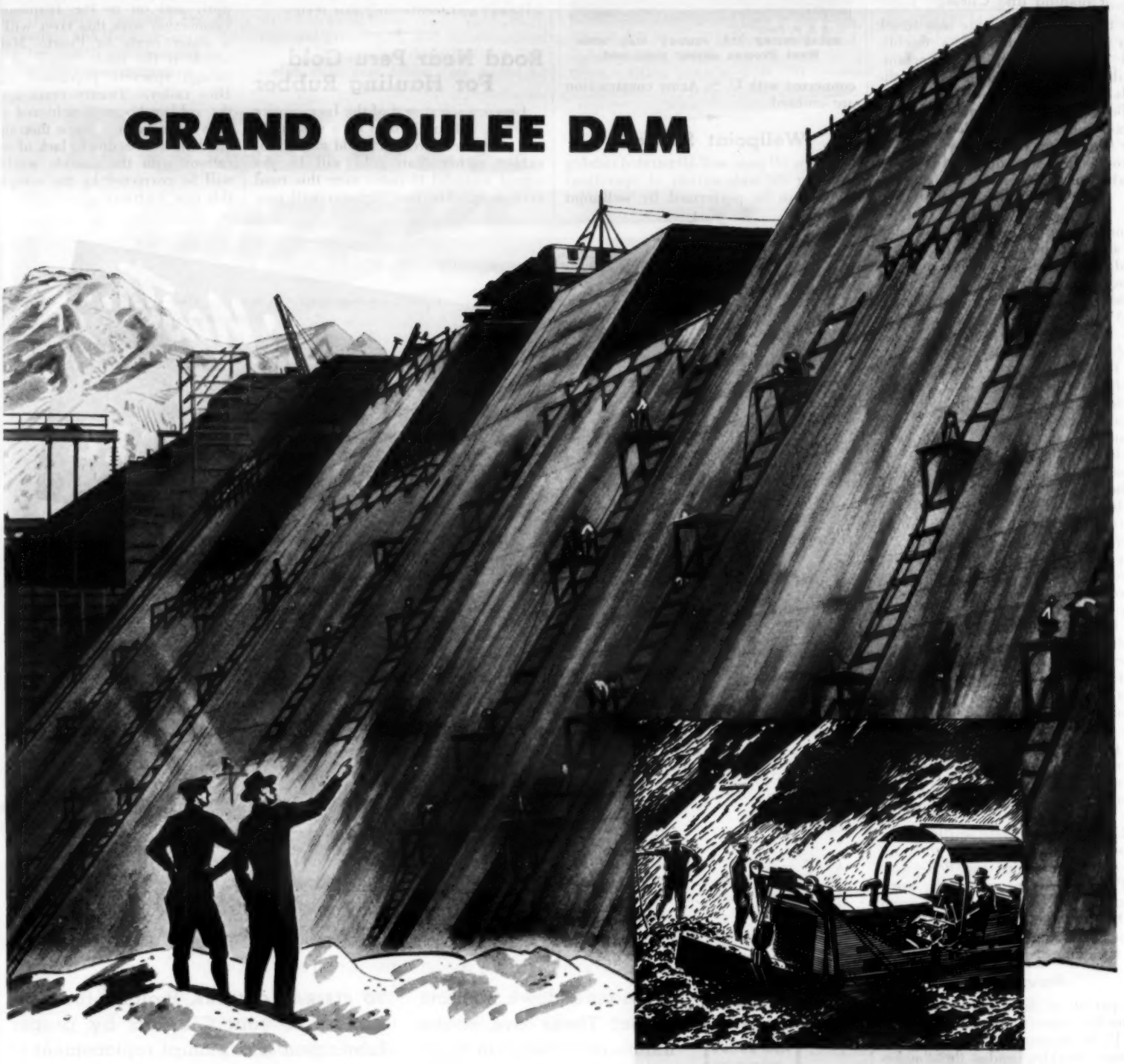
Harper in New War Activity

Robert E. Harper, who for five years skillfully handled the promotion of American Road Builders' Association activities as Director of Public Relations, has been appointed Assistant to the President of Motion Picture Advertising Service Co., New Orleans, La. He will, for the duration, be in charge of the Washington office and its relations with the various government agencies in the production and distribution of war activity films.

Mr. Harper will be located at 603 International Bldg., 1319 F St., Washington, D.C. For the past year he has been Chief of Special Events on the War Savings Staff of the United States Treasury Department.

Peerless Promotes Rankin

The Peerless Pump Division, Food Machinery Corp., Los Angeles Calif., has announced the appointment of Dan R. Rankin as Acting Chief Engineer of the company. Mr. Rankin has been associated with Peerless for the past five years and was assistant to the Chief Engineer. Since the beginning of the war, he has devoted much time to solving engineering problems in connection with adapting Peerless pumps to new applications and uses in various fields.



One of hundreds of important construction jobs where Shell Diesel Lubricants helped keep equipment operating at peak efficiency 24 hours a day.

Let us show you how Shell can fill *your* Diesel needs.

SHELL OIL COMPANY
Incorporated

SHELL
DIESEL
LUBRICANTS
For Heavy Duty

Fast Concrete Paving On Army Field Runway

(*Continued from page 2*)

spread it. The second paver operator had to pay more attention to spreading his batches as they were dropped on the first layer of concrete, although he had three puddlers working in front of the finishing machine.

Finishing and Curing

The top layer of concrete was struck off by the first screed of a double-screed Blaw-Knox finishing machine. No vibration was provided for the screeds nor for the joints or sides of the slab. Behind the finishing machine came a Flex-Plane machine which had the device for cutting the dummy joints at the front. This was operated by two men who cut the joint or slot and inserted the asphalt-impregnated felt strip. The operator saw to it that the machine was run at the proper time and speed and that the rear finishing screed worked to furnish a smooth uniform surface. The final machine finishing was provided by a single Koehring longitudinal finisher.

The first two hand finishers used a pair of aluminum 10-foot drag straightedges followed by a second pair who worked out surface bubbles from the concrete by pulling a hard-surfaced 1-inch garden hose over the surface. This was pulled carefully over the top and was held with the ends vertical by means of a pair of old reinforcing rods pushed into the hose. This dragging left the concrete free from any air pockets and ready for the pulling of an 8-inch canvas belt by the same two men, leaving a herringbone marking on the surface of the runway.

Three men working from Ted Carr rolling bridges edged the expansion joints. For a foot each side of the center the sides of the joints were carefully broomed with a 12-inch camel's hair brush to remove any markings from the finishers' tools. There was an additional man on each edge to take care of the edging against the forms.

To protect the adjacent slab, two men scraped and broomed the fresh concrete carried over by the screeds of the finishing machines. Similarly one man on the side where the forms were used spaded out any concrete spilled over the tops of the forms to make their removal easy. The curing was done with Hunt Process cure sprayed on by portable outfits run by three men on each side. One man handled the pump, one the long hose and the third did the actual spraying.

Personnel

The paving of the concrete runways was done by contract under the direction of the U. S. Engineer Department. The contractor, working under the "make-haste" order of the War Department, operated the paving outfit seven days a week and completed the six 25-foot strips required for the 150-foot width of the runway, each 6,000 feet long, in 13 or 14 working days.

In the interest of national security, the location of and mention of personnel connected with U. S. Army construction are omitted.

C. & E. M. Photo
Spray-curing the runway slab with Hunt Process curing compound.

Wellpoint Services

A new 60-page well-illustrated catalog showing the wide variety of operations which can be performed by wellpoint installations, from removing ground water on foundation and trench excavation through fire protection and the furnishing of both salt and fresh filtered water to swimming pools, has been issued by the Griffin Wellpoint Corp., 881 East 141st St., New York, N. Y. The catalog is replete with operating data, complete details and dimensions of the Griffin wellpoints, jetting pumps and Vac-u-matic well pumps.

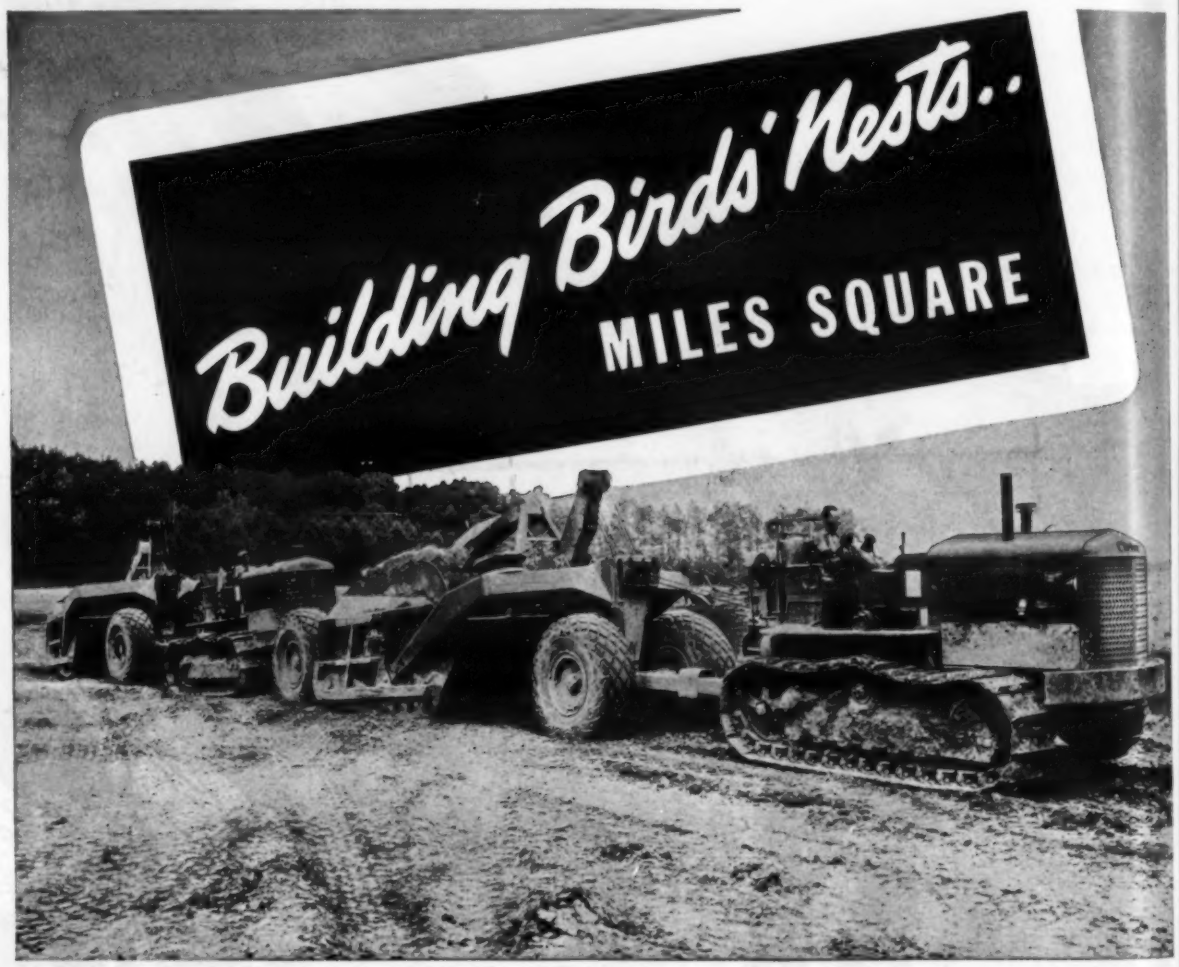
Copies of this catalog will be furnished to readers of CONTRACTORS AND ENGINEERS MONTHLY writing direct to the manufacturer on their business letterheads and mentioning this review.

Road Near Peru Gold For Hauling Rubber

Cuzco, ancient seat of the Inca empire in Peru, is being linked by a new highway with the Marcapata gold mines, but rubber rather than gold will be the prized material to move over this road very soon. The new highway will provide access to the lowlands east of the high Andes where millions of wild rubber trees offer an additional source of this important product to supply the needs of the United States.

The new Urcos-Marcapata highway branches off from the Central Highway of Peru at the village of Urcos just south of Cuzco. The road drops from the Cuzco plateau, 12,000 feet above sea level, into the lowlands and tropical forests of the valley of Madre de Dios for a distance of about 150 miles.

Surveys are being made to extend the highway to Quince Mil, site of an airport, and on to the Inambari River. Connection with this river will provide a water route to Puerto Maldonado, which is the trade center of the rich though sparsely populated Madre de Dios valley. Twenty years ago during the rubber boom it achieved considerable importance. Since then the valley has languished, due to lack of communications with the outside world. This will be corrected by the completion of this new highway.



NO PRIORITIES ON WAR BONDS
Next to the Stars and Stripes, Cletrac is proud to be flying the Minute Man flag. Over 95 per cent of Cletrac employees are purchasing War Bonds by pay roll deduction.

★ No eider-down hangars, these. There are rocks, humps and stumps to move; soft spots and hollows to fill; billiard-table smoothness to be achieved—that our birdmen may have safe and level landing places. No soft snap, this job. It requires rugged power and the ability to stand rough treatment—in short, a Cletrac—the tractor that can take it.

TO CLETRAC OWNERS. Prolong the usefulness of your Cletracs by proper lubrication and prompt replacement of worn parts. Take advantage of the built-in durability of your Cletrac by frequent inspection and careful maintenance. Your Cletrac dealer is anxious to help you conserve *all* of your equipment. Ask his advice.

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CLEVELAND, OHIO

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GASOLINE AND DIESEL

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

NEED A BIG Trailer?
La Crosse Makes Them Up To 200 Ton Capacity
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Concrete Placement The Pumpcrete Way

The second edition of "Pumpcrete Practice", a manual of concrete placement by the use of the Pumpcrete machine, prepared especially for contractors, engineers, estimators and operating men, has just been issued by the Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis.

This letter-sheet size bulletin No. 422 contains 164 pages of text on the Pumpcrete method of placing concrete through pipes. The first chapter discusses the Pumpcrete method in general, the second gives cost, the third discusses the distributing method and the handling of the pipe lines, the fourth discusses the mixing plant, the fifth is an important chapter on the behavior of concrete, while the sixth chapter contains miscellaneous data and specifications. The concluding seventy pages of the bulletin are given over to typical Pumpcrete jobs which have been described by the technical press.

Copies of the Bulletin 422 may be secured direct from Chain Belt by readers who mention this review.

Floodlighting Units For Lighting Night Work

Nite-Hawk portable floodlight and searchlight units for lighting night construction of all types, repair yards, quarries and gravel pits, and for emergency airport lighting, are described and illustrated in a new folder just issued by Lister-Blackstone, Inc., 1706 So. 68th St., West Allis, Wis. In addition to providing light, these units serve as a source of electric power for operating a variety of electric tools.

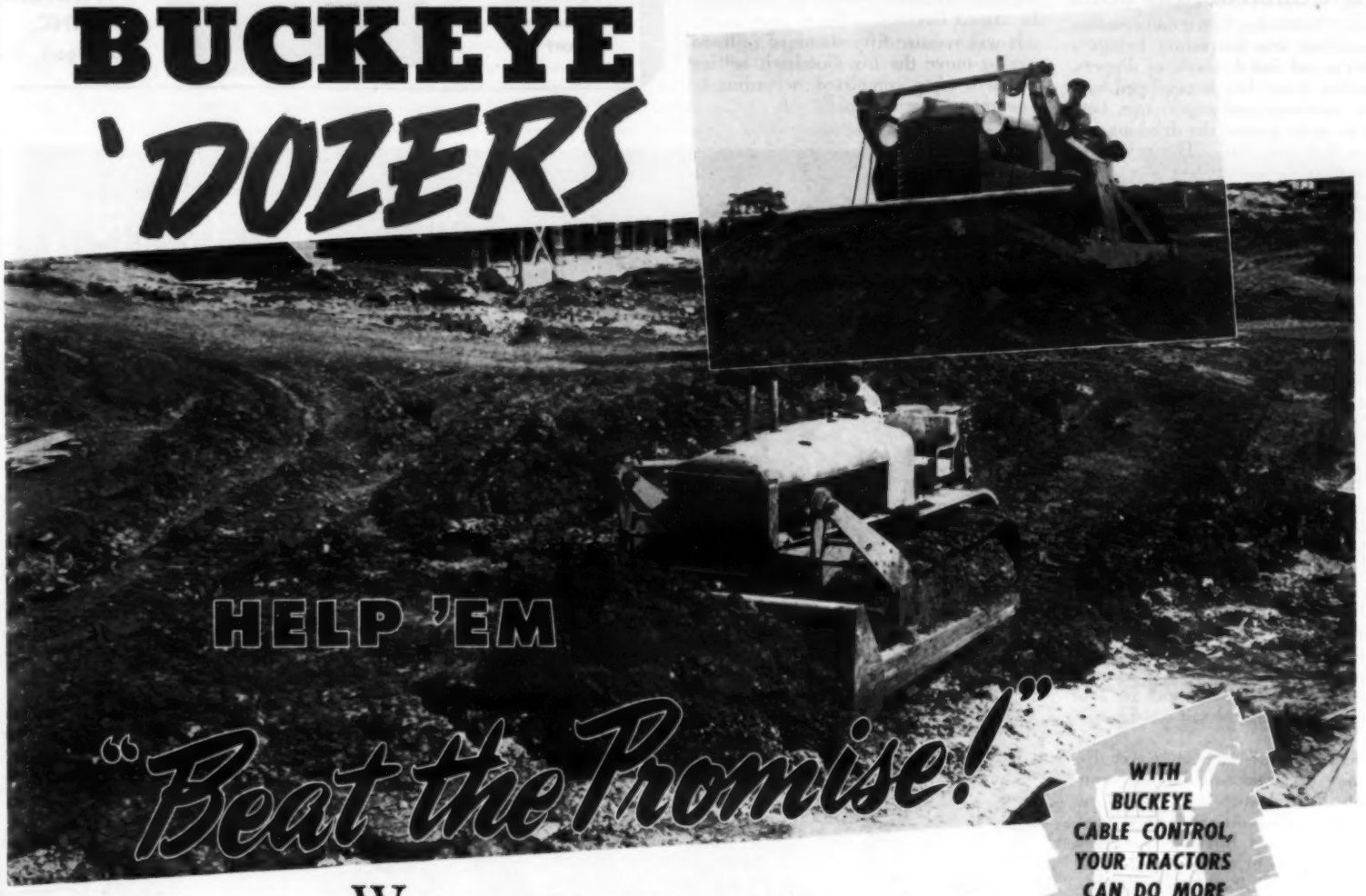
These units, which are equipped with four 1,000-watt wide-angle floodlights, one in each corner to provide light where and when it is wanted, are available in a number of models and mountings. Model NH5-W is wheel-mounted and equipped with four telescoping floodlights which may be raised or lowered as desired. Model 24S-NH5W is a wheel-mounted searchlight unit, equipped with two floodlights in the rear, and a 7,000,000-candlepower searchlight at the front. Model NH5S is a skid-mounted floodlighting unit, easily transported in a truck. Other models, with 250-ampere welding attachment, are also available.

Copies of this bulletin, containing complete details on these Nite-Hawk lighting and power units, may be secured by interested contractors and engineers direct from the manufacturer by referring to this item.

New Assistant Manager At American Steel & Wire

Charles H. Eisenhardt has been appointed Assistant Manager of the electrical, wire rope and construction materials sales division of the American Steel & Wire Co., United States Steel subsidiary. Mr. Eisenhardt has been associated with the company since May, 1925, and in his new position succeeds R. L. Rhodes, who has resigned.

BUCKEYE 'DOZERS



WITH BUCKEYE CABLE CONTROL, YOUR TRACTORS CAN DO MORE JOBS!

WHERE speed and sustained high output is a *must*, you'll find fast-working Buckeye cable 'dozers hard at work. These output-makers have what it takes to deliver the *most* out of every hour on the job — accurate, lightning-fast cable control; balanced weight that helps, not hinders, tractive effort; scientific blade design to roll bigger-yardage loads and make it easier on the tractor — every practical feature you need in a 'dozer that can help you beat today's hurry-up schedules.

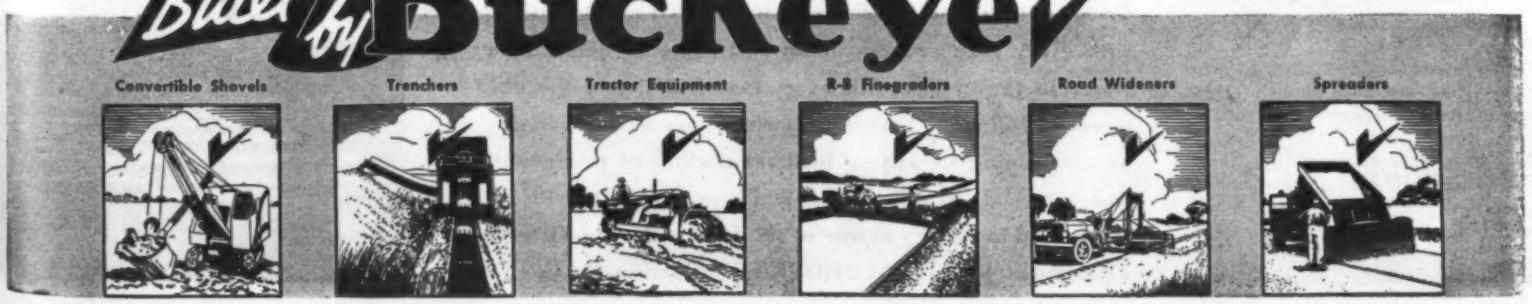
For real help on your tractor equipment problems, see your Buckeye distributor and get the *facts* about Buckeye Bulldozers, Trailbuilders and Power Control Winches.

50 YEARS OF PROGRESS BUCKEYE 1892 1943

See our ad on page 47

THE BUCKEYE TRACTION DITCHER CO.

Built by Buckeye



The Ajax Mobile Drink-Well unit

Better Water Service On Construction Jobs

The cry "water boy" on a construction job nowadays less frequently brings a boy with a pail and a couple of dippers. The modern water boy is equipped with a closed container and paper cups, both carried so as to protect the drinking water from dust and dirt. The newest of these sanitary dispensers to come to our attention is the Ajax Mobile Drink-Well of the U. S. Envelope Co., Springfield, Mass.

The galvanized-iron water tank holds 17 quarts and is 16 inches high, or 19 inches to the top of the carrying handle, 15 inches wide and 7¼ inches deep. It is equipped with a top carrying handle, and also strong web straps with adjustable buckles and snap hooks for carrying the tank on the back or at one side. A swivel locking bar holds the cover firmly on the tank.

Water is dispensed through a thumb-push self-closing faucet at the bottom of the tank which is several inches above the lower end of the protecting apron which prevents the ground touching the faucet or cups when the tank is set down. A steel cup dispenser holds 250 Ajax paper drinking cups that pull out easily one at a time and yet are protected from dust and dirt. A waste cup bag is attached to the tank so that used cups need not litter the ground. Lugs can be provided for installing a salt tablet dispenser.

Full details of this sanitary water dispenser may be secured from the manufacturer or its divisions, Logan Drinking Cup Co., 68 Prescott St., Worcester, Mass., Pacific Coast Envelope Co., 416 Second St., San Francisco, Calif., or U. S. Envelope Co., 2828 E. Twelfth St., Los Angeles, Calif., by mentioning this descriptive text.

Reports on Roadside Development Published

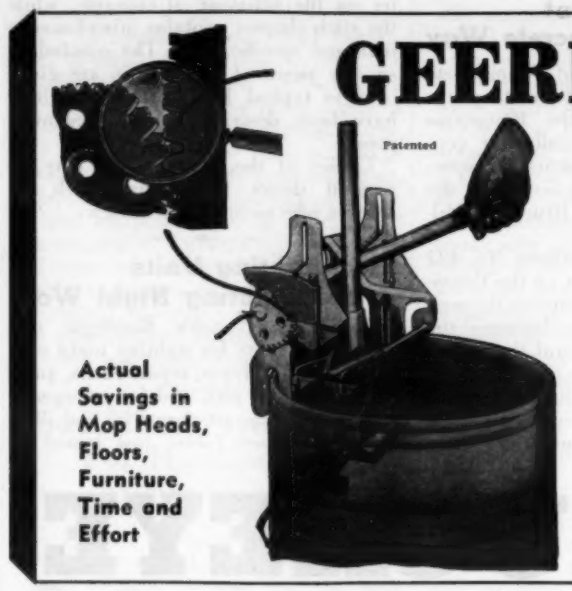
The reports of the Committee on Roadside Development and the special papers presented at the Twenty-First Annual Meeting of the Highway Research Board, held in Baltimore, Md., in December, 1941, have just been published. In addition to the report of the Committee on Roadside Development by H. J. Neale, Chairman, the volume includes the reports of the project committees on highway types and roadside areas, right-of-way and roadside control (zoning), erosion, ecology, economics, and education and public relations.

The Committee on Roadside Development consists of H. J. Neale, Landscape Engineer, Virginia Department of Highways, Chairman; Franz A. Aust, Associate Professor of Landscape Design, University of Wisconsin; Frank H. Brant, Landscape Engineer, North Carolina State Highway and Public Works Commission; Dr. Frederic E. Clements, Carnegie Institution of Washington; Arnold Davis, Soil Conservation Service; Professor P. H. Elwood, Iowa State College; George B. Gordon, Public Roads Administration; Dr. John Monteith, Jr., Bureau of Plant Industry, Department of Agriculture; A. R. Nichols, Morrell & Nichols, Inc., Landscape Architects and Engineers; Hugh R. Pomeroy, Director, Virginia State Planning Board; Henry J. Schnitzius, Indiana State Highway Commission; Wilbur H. Simonson, Senior Landscape Architect, P. R. A.; and John L. Wright, Connecticut State Highway Department.

Conveyor Belt Order Largest in History

The largest single order for conveyor belt ever written in the history of the rubber industry, part of a huge war order, has been awarded to the B. F. Goodrich Co., Akron, Ohio. The belting, which will total more than 66 miles in length, will go into production immediately in one of the company's plants now engaged in the manufacture of rubber and synthetic rubber products for the armed forces.

It will require fifty standard railroad cars to move the big Goodrich belting shipment when completed, according to a company official.



Everywhere MARIONS Are Setting The Stage for Victory!

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

In open pit mines, digging raw materials for fighting tools . . . in quarries, gravel pits and on sand piles . . . on vast Army, Navy and Maritime construction projects . . . in shipbuilding yards . . . along cargo loading docks, MARIONS of every description are at work putting new confidence into the United Nations with every swing of the boom . . . bringing defeat ever closer to the enemy with every load it delivers. Yes, the powerful influence MARION machines are wielding in this war is helping to write a brilliant chapter of production and material handling accomplishments that will be recognized in history as one of the forerunners to Victory.
THE MARION STEAM SHOVEL CO., Marion, O., U.S.A.

MARION
SHOVELS • DRAGLINES • DRAGSHELLS
CRANES • PORTAL CRANES • WALKERS

WORKING FOR VICTORY: DIGGING — Coal • Magnesium Iron Ore • Copper Ore • Bauxite • Manganese • Nickel Molybdenum • Sand & Gravel • Clay
MATERIAL HANDLING — Shipbuilding and Cargo Loading
BUILDING — Airports, Ordnance Plants, Arsenals, Army Camps, Marine Bases, etc.

Texas Highway Shop Saves by Ingenuity

A Skillful Mechanic and Enthusiasm Guided Along Productive Lines Mark the Work at District 2

✦ THERE is plenty of work to do in Texas, and every employee of the Texas Highway Department knows that his job is contributing to the war effort. Consequently there was little grumbling at the longer hours instituted since the war began. Before December 7, 1941, they worked 8 hours a day for six days a week; today that has been extended to 10 hours a day, from 8 to 12:30 and 1 to 6:30. They get work done, and there is no getting behind because the number of stars on the District service flags is increasing. Texas knows there is a war on.

When we visited the office and shops of District 2 at Fort Worth, we found everyone really enthusiastic about what he was doing—no mental or physical laggards. The condition seemed so prevalent that I asked Joe Dillingshaw, District Mechanic, how he accounted for it. His reply told the story, "We have to be enthusiastic to keep up with Mr. Woodward." E. C. Woodward, now District Engineer at Fort Worth and formerly at Waco and Wichita Falls, is 65 and is filled with the joy of living and doing. The office, shops and equipment are all tokens of the joy of doing that permeates the atmosphere in District 2.

A Few Examples

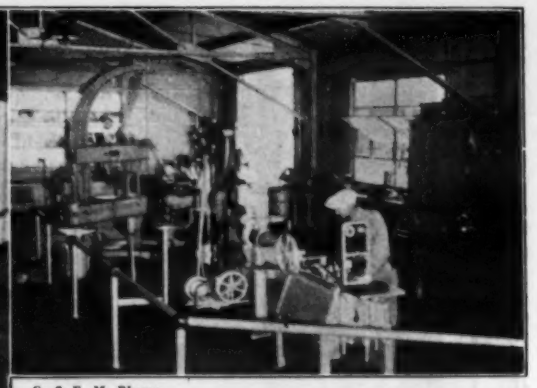
In the reception rooms of the office building, presided over by Miss Ila May Lanham, is a drinking fountain that gives forth icy water at the touch of one's foot. It seems that there used to be a spouting fountain there and then came an epidemic of throat disease so the mechanics devised a fountain which the mouth could not touch and which worked by a foot pedal, the water being picked up in a conical paper cup for sanitary reasons. The parts are all nickel plated and it looks like a standard manufactured job.

Beneath one of the storage buildings is a tire vault that is dark, well-ventilated and maintains a uniform temperature as shown by a maximum-minimum thermometer hung there. The vault was dug as a NYA project about six months ago when it looked as though tires might need more than the usual care and attention. It was concreted and a ventilation duct run to the roof to cause a slight draft, while the heavy locked wooden door has a decorative star formed by holes bored to permit the entrance of air.

In the storage yard are 300 tons of pump rods, or sucker rods as the oil industry calls them, which the District bought up as soon as it looked as though there would be a shortage of reinforcing steel. They were purchased and allocated to jobs prior to May 8, 1942, so they are ready for the work as it comes up and the economies of reinforcing are still possible in concrete construction. They have been sorted by length and size so that they are as ready for service as the immaculate stock of a steel distributor.

Since the District has already been called upon to act as a contractor on several access road jobs because of the lack of bids from contractors, they have made several wooden bridges for rolling on the forms for concrete roads, using old Ford brake drums for single-flange

(*Continued on page 44*)

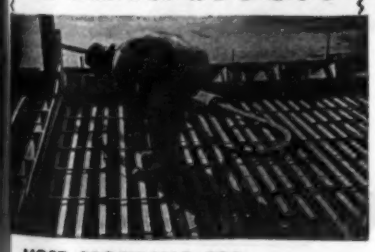


C. & E. M. Photos

E. C. Woodward, District Engineer, District 2, Texas Highway Department, and a section of the machine shop in the repair section of the District Shop.

VIBER COMPANY CONCRETE

VIBRATION



MOST PROFITABLE FOR

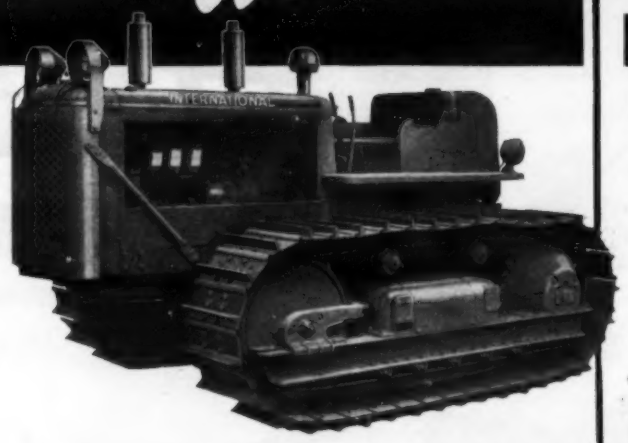
REINFORCED CONCRETE BUILDING CONSTRUCTION

When the job calls for mass vibration—the Viber Vibrator at work above is your best bet. Especially made for walls over 10 inches thick, foundations, large girders, thick floor slabs, columns . . . large reinforced concrete bridges, grade separations, concrete floor systems, concrete arches and rigid frame structures . . . In a word, for all concrete with large aggregate and low water-cement ratio.

Write for complete VIBER data TODAY!

VIBER COMPANY
726 So. Flower
BURBANK, CALIF.

OUR "1943 Models" Are Dedicated to Victory



INTERNATIONAL

VICTORY TracTracTors

Built to Victory Specifications—for Release to Users on Essential Construction Work

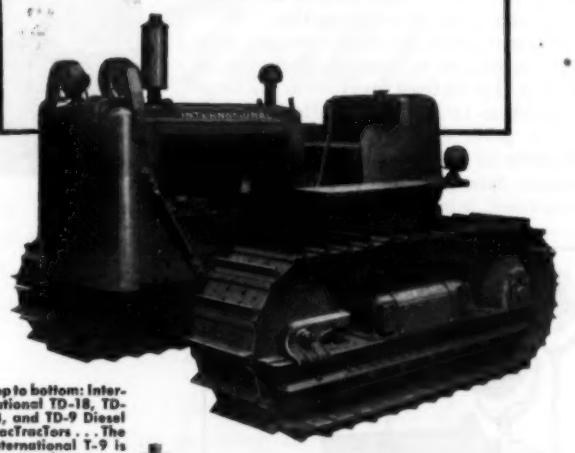
NORMALLY International Harvester would be announcing new 1943 International TracTracTors about this time of year. But this is wartime, and traditional "new models" have been discontinued for the duration.

Just the same, there's a great line of TracTracTors rolling off the assembly lines. We call them Victory TracTracTors. They're all built to Victory (military) specifications. Most of them are going to the Armed Forces. A limited number are available for civilian use on *essential construction jobs.*

Users who qualify for these Victory TracTracTors get machines equipped as shown here. Much of this equipment is normally considered as "attachments." Today it is "standard." These tractors are frozen in design, and users get the benefit of *extra equipment to do essential war-winning jobs.*

Ask the International Industrial Power dealer about Victory TracTracTors and your eligibility. Meanwhile, take good care of the Internationals you have. Rely on International Service to help keep them operating efficiently. Work out a systematic preventive maintenance program with the International dealer. Yours for Victory.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago, Illinois

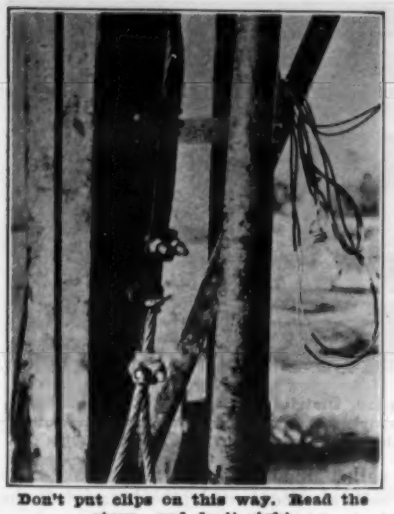


Top to bottom: International TD-18, TD-14, and TD-9 Diesel TracTracTors . . . The International T-9 is not shown.

POWER FOR VICTORY

INTERNATIONAL HARVESTER

BUY MORE WAR BONDS



Don't put clips on this way. Read the story—and do it right.

The Right and Wrong In Putting on Clips

The clip fastening in the accompanying picture is greatly weakened because of the way the clips have been applied to the wire rope. It is no worse than hundreds of other clip fastenings made by wire-rope users who are either careless or just don't know any better. But in these days when replacements of wire rope are hard to get, and machine shutdowns are more costly than ever before in all history, clips are mighty important.

What's wrong with the picture? 1. The clips are staggered instead of all being applied with the base, or saddle, against the pulling rope and the U-bolt against the short end. 2. The short end between the two top clips is slack and can't take any of the load; hence, the top clip is useless, and we have the equivalent of only a three-clip fastening. 3. The bolts on the top clip have obviously been drawn too tight, thereby mis-shaping and weakening the rope at this point, and still further reducing the efficiency of the fastening. 4. The two middle clips are too close together. Clips should be evenly spaced at about six times the rope diameter or more.

Clips should not be drawn up too tight against the rope, but neither should they be permitted to become loose. With the clips fastened, all nuts should again be tightened after the rope has been put under tension. Clips should be tightened with every rope inspection.

When inspecting clip fastenings, it is very important to examine the rope at the last clip furthest away from the loop or bight, as fatigue breaks often develop at this point due to the fact that rope vibration or whipping is dampened here. Fatigue damage is less pronounced with preformed wire rope, which may be explained by the reduced tendency of preformed rope to vibrate or "whip," as this type of rope is more flexible and not as "springy" as non-preformed.

It is important to apply a sufficient number of clips, and the minimum number recommended for different sizes of rope is as follows:

Rope Diameter	Number of Clips	Spacing of Clips	Length of Wrench
½ in. to ⅝ in.	3	3 in.	12 in.
¾ in. to ⅞ in.	4	4½ in.	18 in.
1 in. to 1⅛ in.	4	6 in.	24 in.
1¼ in. to 1⅜ in.	4	7 in.	24 in.
1½ in. to larger	5-7	10 in.	24 in.

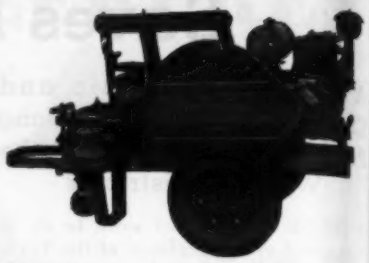
New Bonding Method For Spraying Metals

An entirely new process and equipment, which make it possible for machine components and similar metal parts to be prepared for metallizing electrically, has been announced by Metallizing Engineering Co., Inc., 29-28 41st Ave., Long Island City, N. Y. The main advantage of this new Fuse-Bond process is that it affords an adequate bond on the hardest surfaces, heretofore impossible or impractical to prepare by blasting or rough threading. It also simplifies the preparation of narrow edges, flat areas, and cylindrical parts having keyways or other interruptions in their surfaces.

The Metco Fuse-Bond unit, operating on any 110 or 220-volt single-phase power line, fuses a rough deposit of electrode metal into the surface to be metallized. Electrodes are applied to the work with a special holder, which uses up to six electrodes at a time, depending on the size and nature of the part to be prepared. Small parts may be prepared with this equipment as easily as large shafts, since there is no excessive heating of the base metal nor are the physical characteristics altered. Unskilled labor can learn to operate this equipment efficiently within an hour or two.

Further information on the process and its equipment is contained in Bulletin 44, which may be secured direct from Metallizing Engineering Co.

4" Single Mud Hog Pump on Pneumatic Wheels



The "Old Reliable" Mud Hog brought up to date.

Gearing enclosed—running in oil.

All cut gearing.

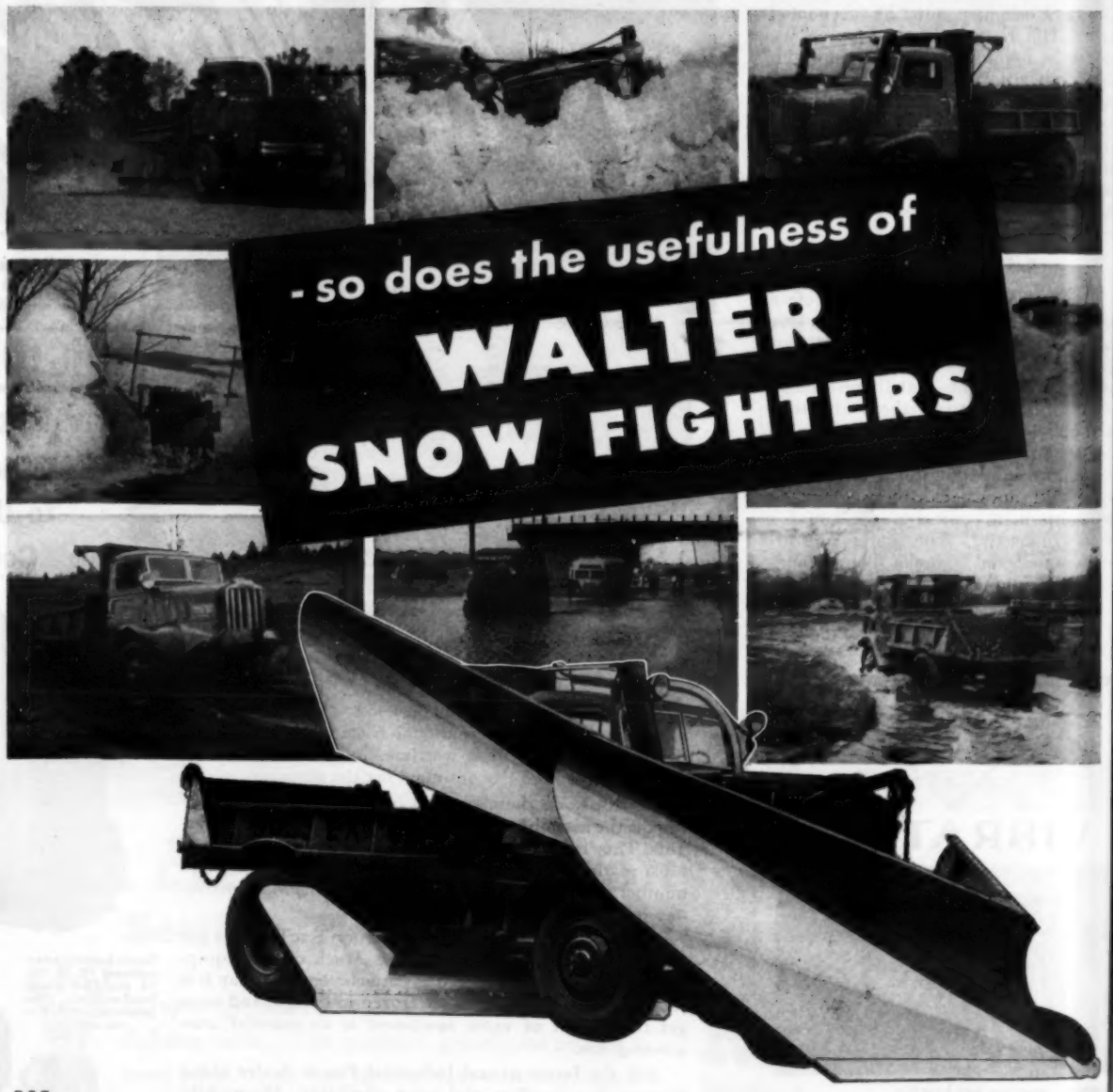
Die-forged crankshaft in pump.

Available in the ball valve Force type, or the flat valve Open Discharge.

Send for Bulletin No. CEM-40-D.

MARLOW PUMPS RIDGEWOOD, NEW JERSEY

Bad Weather Goes 'Round the Calendar



WHEN the blizzards stop, your Walter Snow Fighters are ready for their next important jobs . . . battling spring floods and washouts, summer cloudbursts and fall gales that cripple traffic and damage highways.

The exclusive Walter 4-Point Positive Drive provides the unfailing four-wheel power-plus-traction that is so indispensable in ramming snowdrifts — freeing pavements of hard-packed snow and ice — scraping dirt and gravel roads after rainstorms — or pulling heavy loads through snow, mud, sand, ruts or up stiff grades, without bogging down, slipping or stalling.

The basis of Walter 4-Point Positive Drive is its three patented lock differentials which automatically proportion the power to each wheel according to its traction at any instant. Suspended Double Reduction Drive provides greater gear capacity, reserve power, higher ground clearance and less unsprung weight. These, plus many other engineering features, make Walter Snow Fighters a sound investment for everyday and emergency service. Write for full details.

WALTER MOTOR TRUCK CO. • 1001-19 IRVING AVE., RIDGEWOOD, QUEENS, L. I., N. Y.

Model NH5W with 4-30,000 C.P. floodlights.

The NITE-HAWK Gives You:

LIGHT—Where you want it—when you want it.

POWER—To operate hand tools—saws, drills, hammers, etc.

Floodlight and Searchlight Units up to 14 million candlepower.

Write for Bulletin 161

LISTER-BLACKSTONE, Inc.

1706 So. 68th Street, MILWAUKEE, WIS.

Bill Requires License For County Engineers

Only licensed engineers may be appointed as county highway superintendents, county engineers or city engineers in New York State, according to a bill introduced in the New York State Senate by State Senator Thomas C. Desmond, member of the American Society of Civil Engineers and former Director of the New York State Society of Professional Engineers.

This bill provides that any person hereafter appointed county superintendent of highways, county engineer, city engineer or to any similar position in New York State shall be a duly licensed professional engineer. At present, a number of laymen are employed for these technical positions. The proposed law would not affect those who hold such positions on June 30, 1943, and are in office continuously thereafter. This bill was introduced at the suggestion of the New York State Society of Professional Engineers.

Copies of the bill may be secured by those interested direct from Senator Desmond, Room 430, The Capitol, Albany, N. Y.

Honduran Road Job Employs 2,000 Men

Approximately 2,000 workers have found jobs on an Inter-American project in Honduras. The wages paid on this project are helping tide the area over the loss of income from banana exports. These men are improving a section of the road from Potrorillos, the head of rail connections to the Atlantic coast, and the capital of Honduras, Tegucigalpa.

The project was undertaken by Honduranian authorities and the Institute of Inter-American Affairs to provide emergency employment for displaced banana workers and, at the same time, to make a valuable contribution to the road system of the country.

. . If Freedom Fail!

HYDRAULICS Rodgers KEEP THE WORLD MOVING

Manufacturers of:
UNIVERSAL HYDRAULIC PRESSES
TRACK PRESS EQUIPMENT
HYDRAULIC KEEL BENDERS
HYDROSTATIC TEST UNITS
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PORTABLE STRAIGHTENER
FOR PIPE AND KELLYS

TODAY, Americans are uniting their energies to build for the future a world-wide faith in neighborliness and good-will. A practical faith born in the hearts of people who believe in the Four Freedoms, who have built this great Nation with simple courage through the strength of common effort.

On any street in the United States, if you watch the faces of the people as they pass, you will see the secret weapon of the free nations — the tremendous power of ordinary people working together. It is the simple weapon that has turned the American Nation into a gigantic arsenal, and sent American fighting men into every theatre of war around the world.

Rodgers Hydraulic Inc. have dedicated their entire resources to smashing the Axis chain of cruel brutality and arrogant domination of free people — everywhere. Rodgers Hydraulic Inc., St. Louis Park, Minneapolis, Minnesota.

Rodgers HYDRAULIC Inc.

White's engine analyzer assures a thorough and positive check-up on the operating condition of the engine, eliminating costly guesswork.

Truck Conservation Program Intensified

In 1942 The White Motor Co. converted its entire sales force into an army of trained men to spread the gospel of conservation and truck maintenance because of war emergency conditions. Behind it was a practical plan of preventive maintenance and parts conservation. Prior to promoting this campaign, the company closely scrutinized the equipment of every branch and distributor to make certain that the very latest in time-saving tools and machinery was available. Skilled mechanics, modern equipment, and a well-conceived operating plan insured the best of service, which was offered not only to the operators of 65,000 White trucks in the United States but to the users of other makes as well.

The 1942 program was an outstanding contribution to the nation's welfare, but the 1943 program is even more intensive to meet still greater needs. A comprehensive series of two-day meetings in twelve key cities started the 1943 training program. This was followed by schools at every branch and at all of the dealers under the direction of branch managers, distributors and wholesale men. These meetings stressed White's preventive maintenance plan, which calls for systematic check-ups and service on a predetermined schedule and takes into account the life and maintenance requirements of all of a truck's working parts.

In its program White has made a thorough study of the tremendous job which confronts the service facilities of the entire truck industry. Today some 54,000 communities in the United States, 43 per cent of the national total, depend entirely on trucks for freight service and could not exist if the industry failed. In the 3,071 counties of the United States, there are 306 principal points in an equal number of counties where service must be provided for 2,294,000 trucks of 1¼ tons and up. The 1941 figures also show that 50 per cent of all trucks were registered in these 306 counties, and that approximately 620,000 were 2 tons and up. This indicates where the service load will fall the heaviest.

White invites truck users in all parts of the United States to visit the nearest White branch or distributor to secure the full details of this program.

Welding Aluminum

A completely rewritten edition of its welding booklet has just been isued by the Aluminum Co. of America, incorporating not only all up-to-the-minute information on aluminum welding but also details on the art of brazing. The booklet is designed to help conserve aluminum, eliminating waste and scrap losses and reducing tool breakage.

Copies of this booklet "Welding and Brazing Alcoa Aluminum" may be secured by interested contractors and engineers direct from the Aluminum Co. of America, Pittsburgh, Penna., by referring to CONTRACTORS AND ENGINEERS MONTHLY.

Level Monolithic Roof and Floor Forms Faster!

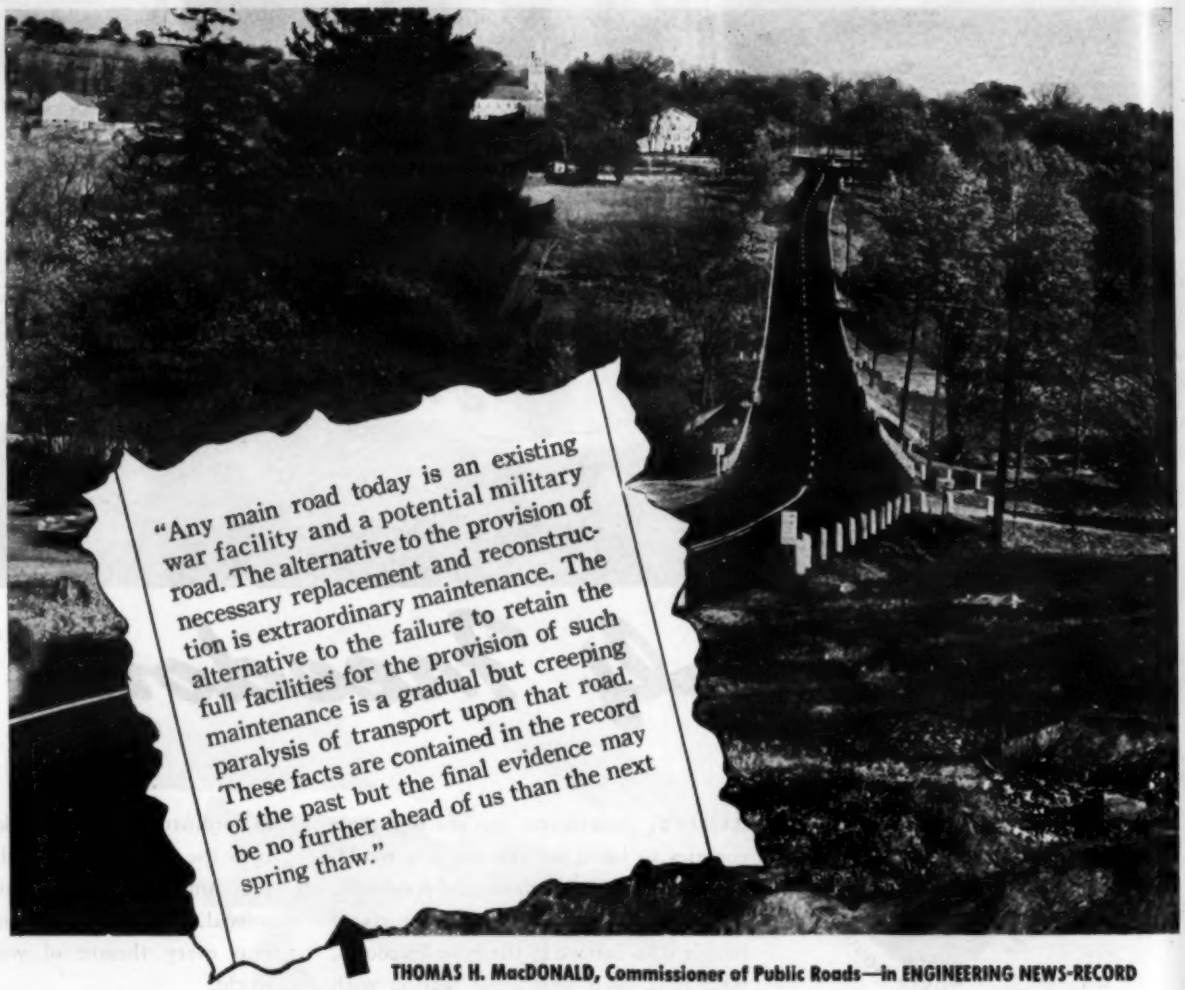
Simplex Screw Jacks lift, lower and support faster and safer on construction jobs. Leveling of forms is aided by floating cap (up to 9° float). Tough malleable bases — safety peep-hole prevents over-extension. 15 sizes with ratchet head; 27 sizes with 4-hole head.

Templeton, Kenly & Co.
Chicago, Ill.
Better, Safer Construction Jacks Since 1899

Simplex LEVER · SCREW · HYDRAULIC Jacks

Make Your Jacks Last Longer!
Proper lubrication, care and handling will do it. Send today for a bulletin on the care of jacks.

ATTENTION! HIGHWAY OFFICIALS AND ENGINEERS


"Any main road today is an existing war facility and a potential military road. The alternative to the provision of necessary replacement and reconstruction is extraordinary maintenance. The alternative to the failure to retain the full facilities for the provision of such maintenance is a gradual but creeping paralysis of transport upon that road. These facts are contained in the record of the past but the final evidence may be no further ahead of us than the next spring thaw."

THOMAS H. MacDONALD, Commissioner of Public Roads—in ENGINEERING NEWS-RECORD

THUS Commissioner MacDonald sums up the vital problem of wartime road maintenance and repair that faces highway officials and engineers today.

Excessive wear to tires and damage to cars are only part of the cost of poor roads. Neglected highways mean delays in transportation of vital food and military supplies, lost man hours by America's industrial workers.

In considering your maintenance problems, remember that there is a right type of Tarvia* and a right Tarvia method for almost every type of road maintenance and repair. The Barrett Tarvia field man will be glad to show you the most economical ways to service your district quickly and dependably. He has at his command all Barrett's 37 years of successful paving experience.

Let him suggest how you can keep your roads in the best condition to meet the requirements of a nation at war.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK
ONE OF AMERICA'S GREAT BASIC BUSINESSES

New York . . Chicago . . Birmingham . . St. Louis . . Detroit . . Philadelphia . . Boston . . Providence . . Rochester . . Minneapolis . . Cleveland . . Columbus . . Toledo . . Youngstown . . Syracuse . . Buffalo . . Cincinnati . . Bethlehem . . Portland, Me. . . Bangor, Me. . . Norwood, N. Y. . . Cromwell, Conn. . . Norwich, Conn. . . Savannah, Ga. . . Norfolk, Va.
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Barrett Tarvia*

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PILE HAMMERS and EXTRACTORS

HOISTS—DERRICKS WHIRLERS

Special Equipment
Movable Bridge Machinery

Write for descriptive catalogs

McKIERNAN-TERRY CORP.
19 Park Row, New York

Distributors in Principal Cities

Maintenance Sealing On Kansas Highways

(*Continued from page* 15)

seals will not last as long as with the larger amount of asphalt, they will last for the duration, particularly as there will probably be less traffic to wear them out.

The seal is applied to half the width of the road at a time to permit traffic to get through at all times. Up to this year, the chats or sand-gravel was applied by Buckeye, Galion or other approved spreaders on the back of trucks running in reverse, but in an effort to reduce contract prices, the contractors this year are permitted to windrow the seal aggregates along the shoulder and blade them over the seal, provided the equipment does not run on the asphalt. This is done by using a fast tractor or heavy truck running with the left wheels as close to the seal as possible, pulling a maintainer or blade grader with the blade set wide to the left so as to throw the aggregates over the asphalt. Then a wide broom drag, very light in construction, is used with fiber brooms to complete the uniform distribution of the seal material. The road is then rolled and dragged for a period of at least three days by flat and pneumatic-tire pull-type rollers.

For some of the sealing, when it is let by contract and the contractor has the proper equipment for heating the tank cars, an asphalt cement of 150 to 250 penetration is used with the coarser crushed-rock cover material. The use of finer sand cover materials with this type of asphalt is not considered so successful, as the surface has a tendency to become "slick" in wet weather. The standard application of the aggregates in this sealing operation is between 20 and 30 pounds per square yard, with the straight asphalt requiring the larger amount and the cut-backs the smaller. This amounts to 125 to 150 cubic yards per mile of road.

Personnel

The Kansas State Highway Department is headed by D. J. Fair, Director, who gives full time to this work, with R. C. Keeling, State Highway Engineer, and L. L. Marsh, Maintenance Engineer.

Less Snow Plowing On Nebraska Roads

In an interview on snow removal reported by the Nebraska Good Roads Association, Wardner G. Scott, State Engineer, said, "It is anticipated that the service previously rendered will of necessity be materially curtailed both because of the scarcity of skilled mechanics and operators and because of the difficulty encountered in maintaining an adequate supply of equipment repair parts."

Snow-removal equipment has been sent first to plow the roads to war plants and training bases, on which 16 of the state rotary plows were concentrated this winter. Attempts to buy additional snow fence for new roads and for replacing worn parts of the 850 miles of fence installed in recent winters to help combat drifting snow have been unsuccessful.

Mr. Scott warned motorists that because of the shortage of help it would be inadvisable for them to use the highways during bad storms. "In previous winters we have kept the equipment on 24-hour duty to assist stranded motorists but this may not be possible this season," Mr. Scott declared. "Motorists can help considerably by staying off the highways during snow storms."

The Department, in most cases, has found it impossible to keep its equipment in continuous operation during a snow storm or to continue operations on a 24-hour basis until all highways were restored to normal. Every effort possible has been made to render adequate service but cooperation by motorists is still vitally necessary.

NEW H-S PORTABLE ABRASIVE CORE DRILL

For heavy drilling of reinforced concrete—taking test cores in concrete highway construction and floor slabs. Drills holes

3½" to 6½" dia. Smaller models down to ½" diameter. Gasoline or electric power. Write for descriptive circular.

HOWE-SIMPSON, Inc.
50 E. Broad St.
COLUMBUS, OHIO

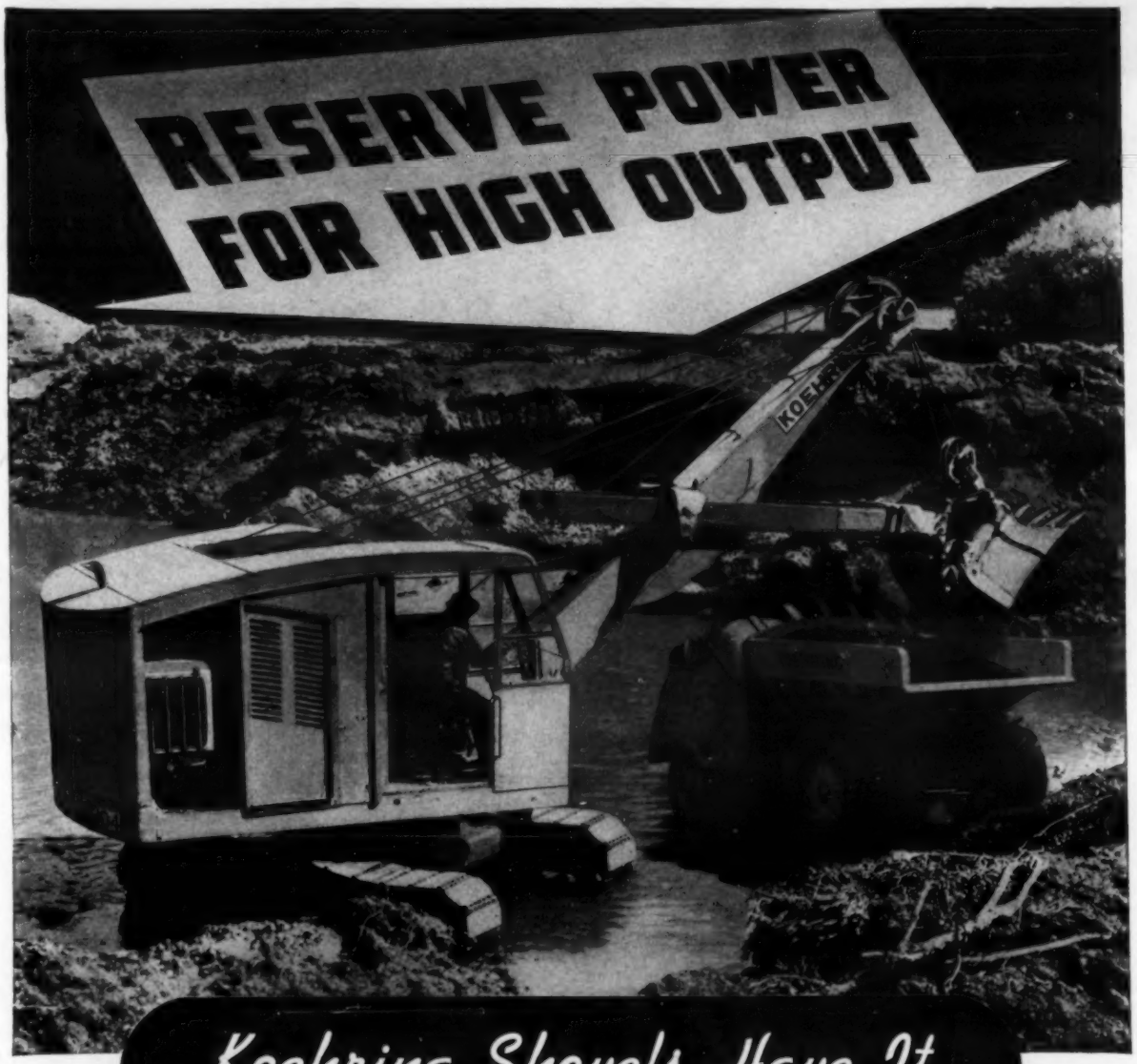
RUD-o-MATIC TAGLINE

A FOOL-PROOF TAGLINE

The Rud-o-Matic Tagline is operated on a spring principle and maintains at all times a positive tension sufficient to steady a clam shell bucket under any and all conditions, and will operate perfectly with the boom at any angle. It eliminates all the grief usually encountered with the average tagline as there are no weights, tracks, pins, carriages, or sheaves to wear out or to get out of order. Because of the large bearing and fewer sheaves, the saving on cable alone would eventually pay for it.

Tagline is complete with fair lead and cable attached and can be installed in less than one-half hour. Most of the crane manufacturers have adopted the Rud-o-Matic as standard equipment.

Manufactured by
McCaffrey-Ruddock Tagline Corp.
2121 E. 25th St., Los Angeles



Koehring Shovels Have It

Koehring shovels have the reserve power and the stamina to take the extra burden of 'round the clock performance day after day. The extra speed which has helped them set output records on ordinary work is now helping to do the extraordinary job required. Sustained output is assured by the ability of Koehring shovels to take hard service with little time out for breakdown or repair. These features keep Koehring shovels digging hard; all welded construction . . . chain crowd . . . self-cleaning crawlers . . . heavy duty motor . . . welded dipper . . . and many more.

KOEHRING COMPANY • MILWAUKEE, WISCONSIN

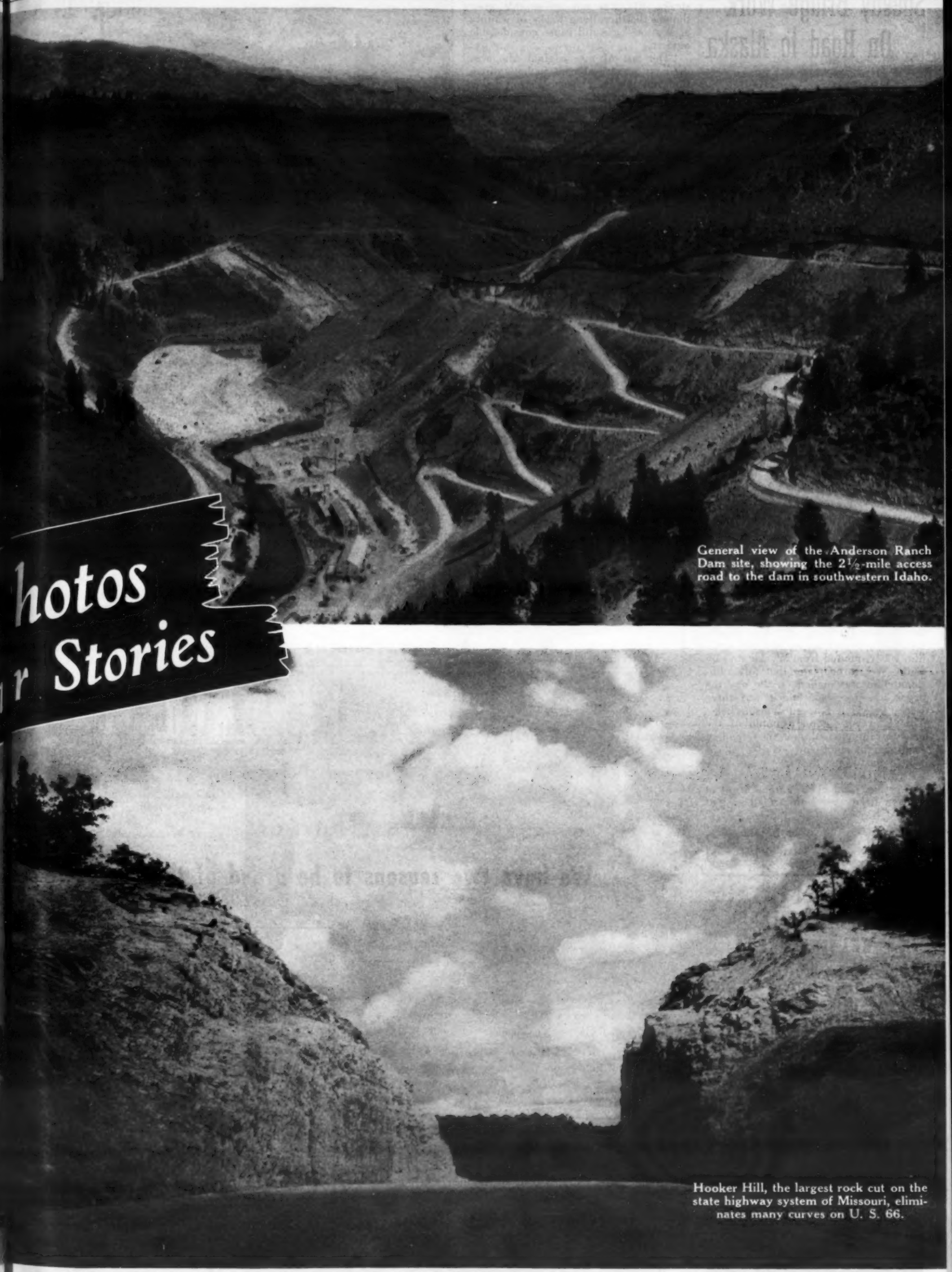
KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Heavy grading on a relief highway for Colorado 83 at Parker, where equipment was pooled to speed completion.

Field
Tell Th

The District 2 Maintenance Shops and Offices of the Arkansas Highway Department, located at Pine Bluff.



General view of the Anderson Ranch Dam site, showing the 2½-mile access road to the dam in southwestern Idaho.

Hooker Hill, the largest rock cut on the state highway system of Missouri, eliminates many curves on U. S. 66.

d hotos
Thr Stories

Speedy Bridge Work On Road to Alaska

(*Continued from page* 19)

MacFee, one of the Bush pilots flying an Engineers' H Wasp-powered Norseman plane on floats, had a trip to Fort Nelson and return. Page had flown photographers and would-be photographers in Canada before and he gave me a ride that I shall not forget soon. Between loading my 70DA camera and shooting pictures, I was kept too busy to worry, except momentarily, about the fact that flying 400 feet above the ground keeps you pretty much below existing mountain peaks and far from available water where the plane's floats would be useful. Anyway, we got some good pictures, and the following day the return trip to Mile 210, or the Liard River, was made with the plane.

"The return to Mile 210 was made in order to collect some additional pictures which I had been unable to film before. Two days before I first arrived at Mile 210, the 35th Engineers had holed through with their construction which had begun in March at Fort Nelson. This regiment came face to face with the advance guard of the 340th, who had been working southeast from Teslin since early in June. This meant some 320 miles of road building for Colonel Ingalls' 35th Engineers, and over 200 miles for Colonel Lyons' 340th Engineers since June. Immediately upon meeting, the two regiments did an abrupt about-face to put the finishing touches on their respective sections.

Waiting for Film

"Some time was spent at Headquarters Camp at Watson Lake, which is without doubt one of the most beautiful spots in the Yukon Territory. My film supply was fast approaching an end and more film was requested from Washington by radio. We learned later that this additional film was mailed on the day the order was received, but it was three weeks before it reached Watson Lake. This is a very good example of the heavy strain imposed upon the Canadian facilities for mail and express, all of which must come through by air.

"Early October was warm and the air was crystal clear. The rainbow trout in Watson Lake were biting good so that between the trout and some fine moose steaks, life was not unbearable even though the three long weeks of waiting at Watson Lake did cause considerable anxiety.

"The last of my original film was used up on several trips in both directions on the road from Watson Lake, after which I returned my jeep and its driver to Southern Sector Headquarters at Fort St. John. I remained at Watson Lake until Headquarters Camp of the 340th moved out. Then I went over to the airport at Watson Lake and waited several days longer until finally my film came and I was free to resume the trip to the Northwest."

Bridge Construction

While waiting at Watson Lake, Mr. Bliss watched the construction of a pile bridge by two companies of the 340th Engineers. A saw mill was set up on one side of the Liard River and timbers and lumber were turned out at the rate of 20 MBM per day for over a month.

As soon as the two pile drivers had been set up and the work was organized, the construction of the bridge progressed rapidly. It is a double track bridge with an extended guard rail. If any of our people are of the opinion that our youth has grown soft and decadent, Bliss recommends spending an evening on such a job as the construction of the Liard River bridge.

A D8 with a Hyster winch and a bulldozer crossing the upper Liard River on a pontoon ferry along the Alcan Highway.

"I distinctly recall one evening in particular," Mr. Bliss said, "when the temperature was hanging around zero, and 700 feet of black water gleamed under the spotlights and went flowing past the site at 10 miles per hour. Ice was freezing on every plank and piece of wood, yet our soldiers were driving piles.

(*Concluded on next page*)

HOISTS

STEAM • ELECTRIC
GASOLINE • DIESEL
AND
BELT DRIVEN

- FOR OVER 69 YEARS WE HAVE BEEN BUILDING FINE HOISTING MACHINERY
- OUR DUPLICATE PART SYSTEM INSURES PROPER FIT OF OUR FACTORY BUILT REPLACEMENTS
- FOR THE DEFENSE AND OFFENSE WAR EFFORT KEEP YOUR PRESENT HOIST IN GOOD WORKING CONDITION

We can help you!

We proudly fly these flags

LIDGERWOOD MANUFACTURING COMPANY
Main Office and Works ELIZABETH, NEW JERSEY

We have two reasons to be proud of this Flag

First, of course, we are proud of the Army-Navy "E" flag because it is an award to the 3,000 employees of our Richmond refinery. We have long known that their energy, devotion and skill merit the highest praise.

The other reason is that this flag is a harbinger of better days to come, when we will take pride in offering to industry the fruits of Richmond's tremendous war effort.

Today we can only hint at the giant strides our petroleum research and production have made. We cannot publish the specifications of a host of new products, nor the story of how old products have been sensationally improved. We cannot describe the system by which these products are distributed on a world-wide scale.

But we can promise you that, when these facts become known, they will open new horizons for American businessmen and technicians in many fields. They will prove once again that "know-how" can turn yesterday's impossibilities into tomorrow's accomplishments.

In the meantime, the Richmond refinery and all of Standard of California are living up to the "E" flag, helping bring the inevitable victory nearer.

STANDARD OIL COMPANY OF CALIFORNIA

RPM DELO IS USED IN U. S. NAVY DIESELS First used in submarines, RPM DELO performed so well that it is now also used to lubricate high-speed Diesels in the Navy's mine sweepers, sub chasers, landing barges, patrol boats and ocean-going tugs. In all these vessels it is licking some of the toughest lubricating problems in the world. RPM DELO is typical of Standard's development of petroleum products for war.

RPM DELO

RPM DELO is marketed under the following names:
RPM DELO • Caltex RPM DELO • Kyso RPM DELO
Signal RPM DELO • Imperial-RPM DELO • Sohio RPM DELO
CONCENTRATE
Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity

Alcan Photographer Relates Experiences

(Continued from preceding page)

nailing braces, and laying plank only 10 feet above the river, where a slip meant almost certain death. They were having a darn good time doing it, too, and there wasn't anything soft about anyone in the crowd.

Night Grading

"I met a soldier one night 10 miles from the nearest camp all alone with his big D8 and 12-yard scraper and an angledozer blade on the 'Cat'. The weather was below zero and the wind was blowing a gale. This chap was working in the pitch-black night filling a bridge approach. He would bring the gravel up to the approach with the scraper, a distance of 200 yards, then back the scraper all the way to the pit and drag his blade as he went back so as to level the fill. He did all this with the aid of two spotlights, one in front and one in the rear. I have seen seasoned operators of equipment of this type refuse a similar job in plain daylight, with lots of people and no wolves.

"After one stays around a job like the Alcan Highway for a while, it is easy to see why the job, about 400 miles longer than the famed Burma Road and over terrain where the experts said a road could not be built in any length of time, has been 'holed through' in less than six months. It was a proving ground for modern machines and American men.

By Air and Command Car

"I left Watson Lake on a Monday evening aboard a Douglas freighter. The weather was plumb rotten so we flew on instruments over some of the roughest country in the Yukon Territory to Whitehorse, Y. T. The fog lifted a little as we came into Whitehorse for which I, personally, was grateful. In Whitehorse I reported to the headquarters of the Northern Sector under Colonel Paulis. Major Stann provided me with a command car, but as no extra drivers were available, I drove it myself.

"The first 240 miles north out of Whitehorse toward Fairbanks, Alaska, I covered in eight hours' driving time. The road is good and ready for heavy freight. About 30 miles south of the White River, I was able to get pictures of the last steps in the construction of the Alcan Highway. Here, the 18th Engineer Regiment was finishing its allotted span, 350 miles, which was the biggest chunk of road given to any one outfit.

"Considerable stretches of this road go over glacial ice and across swamps which have to be built up year after year until they stop thawing out enough to let the road through. The last sections constructed, when the temperature was 20 to 30 below zero, will in all probability stand up as well or even better during the short summer season as will the road laboriously built through the muskeg swamps in summer."

The Holing Through

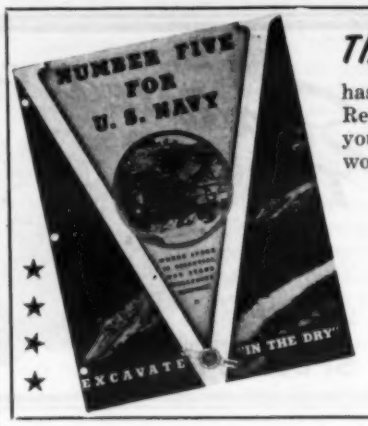
Mr. Bliss arrived just three days too late to witness the coming together of the clearing tractors. A D8 and Angledozer driven by a big colored boy from the 97th Engineers and a similar outfit driven by a big rawboned white boy from the 18th Engineers met without much drama. The last 40 miles of his trip were made by loading his equipment, cameras and bedroll, on an Athey crawler wagon pulled by a D8 Caterpiller, and riding with the driver on the seat of the tractor. This trip took him well within the limits of Alaska, but as time was growing short, he did not continue on to Fairbanks over the road.

End of the Trip

Bliss drove the command car back to Whitehorse and after a 24-hour wait, caught a ride to Morley Bay with a Fairbanks freighter. At Morley Bay, the 340th Engineers provided a ride down to Watson Lake in another command car. Thus, Mr. Bliss covered every inch of the Alcan Road from Dawson Creek at the railhead of the Northern Alberta Railroad to and into Alaska. He passed up the final 300 miles of the road to Fairbanks and returned, he says, with a feeling of lasting regard for the officers and men of the U. S. Engineers, all men from the ground up. The tougher the job, the better they like it.

Mr. Bliss left Alaska on November 1, and on November 10 arrived at the Willamette-Hyster factory at Peoria, Illinois.

Our highway transportation facilities are threatened with being the war's greatest casualty.—*Thos. H. MacDonald, Commissioner, P.R.A.*



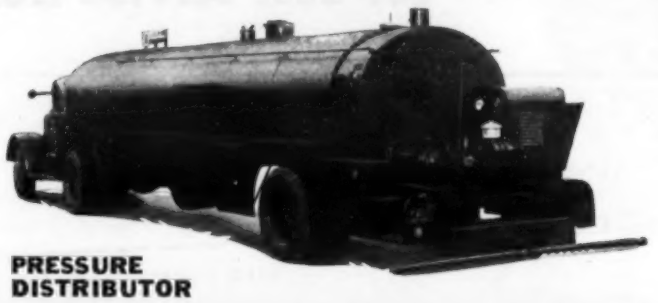
The **WELLPOINT INDUSTRY**

has made its contribution to the war effort. Read about it in this Victory Bulletin—yours for the asking. The bulletin tells by word and picture how wet excavation is converted to dry excavation, saving sheeting and cofferdams. On small or large projects, Wellpoint equipment assures speed and economy during excavating and subsequent operations.

FOR SALE OR RENT

JOHN W. STANG CORP.
NUMBER TWO BROADWAY, NEW YORK CITY
also 2322 Newton Avenue, San Diego, Calif.

AFTER VICTORY
WHAT ARE YOUR PLANS?


PRESSURE DISTRIBUTOR

Unconditional Surrender must come first! But while we are all working to the end, let's think of the future. Let's do some post war planning, too.

Plan so you'll be ready to put our vital Highway System back into tip top shape. Plan the equipment you'll need to do the job, the most efficient way. Plan to purchase Littleford Equipment to do modern Highway Building and Maintenance jobs.

The "Spray Master" Pressure Distributor applies bituminous materials faster, more efficiently, and at lower cost.

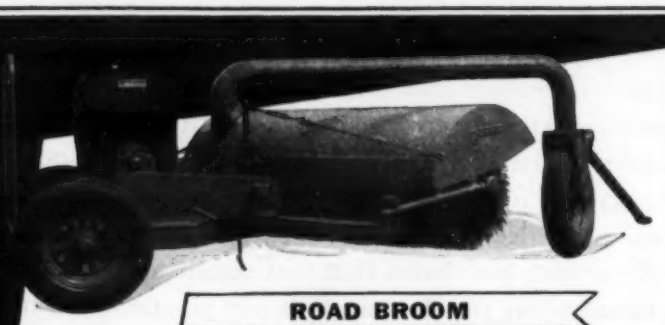
The "Tankar" Heater will heat tank cars of materials faster than any similar unit, produces steam in 2 minutes time.

The "Supply Tank" will transport the materials from the tank car to the Distributor on the job; frameless construction gives better load distribution.

"Road Brooms" either *power driven* or *traction driven* sweep in either direction. They sweep highways before applying materials.

Stick to winning the war, but think of Littleford Black Top Road Equipment for making a better world for the future.

BUY WAR BONDS AND STAMPS


ROAD BROOM

SUPPLY TANK

TANK CAR HEATER

BLACK TOP ROAD MAINTENANCE EQUIPMENT LB SINCE · 1900 **LITTLEFORD**

LITTLEFORD BROS., INC.
485 E. Pearl St., Cincinnati, Ohio

SAND'S-STEVENS
Line & Surface LEVEL

Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
3531 Gratiot Ave. Detroit, Mich.

Sand-Asphalt Paving For Warehouse Floors

(*Continued from page 2*)

sured quantity of asphalt for the proper proportion of mix. The homogeneous mix dropped off the end of the delivery belt into the waiting truck beneath the plant in a depressed roadway.

A 750-gallon fuel-oil tank at the driers furnished the fuel for these units while a gasoline tank at each of the engines powering the plant supplied them. A water tank of about 500-gallon capacity was located at ground level near the center of the conveyor belt to supply water for the boiler.

Hauling and Laying

The hauls for the hot-mix were short, averaging about ¼ mile. The trucks backed up to the doors of the warehouses and, with the tail-gates open, dumped the loads from the Hercules steel bodies onto the edge of the warehouse floor. From here the asphalt was hand-shoveled into place by six men carrying the material in the shovels. The crew laying the floor consisted of these six men, two lute men, four rakers, three hand tampers working against the walls where the roller could not operate, one man operating the 5-ton Buffalo-Springfield tandem roller, one man tending the Littleford Fire-Wagon where the tampers' rakes and shovels were kept hot, and a foreman. A similar group served as a relief crew, except for the lute men, rakers and tampers who worked right through the shift as it was impossible to get relief men for these specialized operations.

The floor was laid in two courses, a base of 2 inches and a top of 1 inch using identical material, but the use of the two courses insured full compaction and hence no shoving or rutting of the floor when the warehouses were put into use.

Personnel

The paving of the warehouse floors with plant-mixed sand asphalt was done by contract under the direction of the U. S. Engineer Department. In the interest of national security, reference to the location of and personnel connected with U. S. Army construction is omitted.

Hendy Acquires Pomona And Crocker-Wheeler Co.

In its wartime program to meet the demands for triple-expansion steam engines for our new fleet of freighters, Joshua Hendy Iron Works, Sunnyvale, Calif., established in 1856, has acquired two other nationally known manufacturing organizations. It first purchased the 55-year old Crocker-Wheeler Electric Mfg. Co., of Ampere, N. J., maker of electric motors and control equipment, and later the Pomona Pump Co., of Pomona, Calif. and St. Louis, Mo., along with its subsidiary, Westco Pump Division. Pomona for 40 years and Westco for 25 years have been widely known for the successful application of their pumps in many fields.

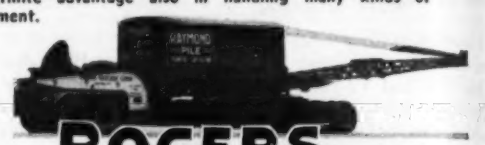
Crocker-Wheeler is to be greatly expanded under the new management of A. J. M. Baker, former Deputy Director General of the British Purchasing Commission and Chief of the Machine Tool Division. George A. McKenna, President and chief owner of Pomona since 1924, has been retained, together with the entire executive personnel. In addition to the plants at Pomona and St. Louis, an entirely new 25-acre plant located at Torrance, Calif., completely equipped for the manufacture of pumps, has been purchased and turned over to Pomona Pump Co. Division of the Joshua Hendy Iron Works.

With the facilities of all of these organizations Joshua Hendy Iron Works intends to leave no stone unturned in organizing to contribute its utmost to the war effort, while planning a place in peaceable world markets.

The American Red Cross is your organization. Support it.

ROGERS BROTHERS CORP.
ALBION, PENNA.

Bulky, cumbersome machinery, and of late heavy pieces of defense equipment must be moved from place to place.
In some localities, where low headroom is encountered, this type of Rogers Trailer is used extensively.
Large machines, with crawler treads "straddle" the girders thus lowering the overall height by several inches, a definite advantage also in handling many kinds of equipment.

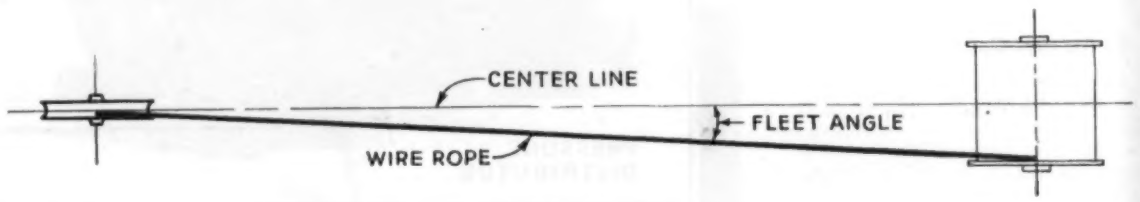


ROGERS
LOW BED-HEAVY DUTY
TRAILERS

Carey Elastite EXPANSION JOINT
Standard in Concrete Construction for 31 Years
ECONOMICAL and EFFICIENT
Asphalt Joint
Fiber Joint
Sub-Grade Felt
THE PHILIP CAREY MFG. CO.
Dependable Products Since 1873
LOCKLAND, CINCINNATI, OHIO

Keep fleet angles under 3 deg.

for best service from wire rope



The "fleet angle," illustrated above, is an important consideration when locating a main sheave in reference to a winding drum. If this angle is too large, there will inevitably be side-wear on the rope as it passes diagonally from the outside edge of the drum across the sheave.

Experience has shown that best results are obtained when the fleet angle is not greater than 1½ deg., with a smooth-faced drum, and not greater than 2 deg. with a grooved drum. When the fleet angle exceeds a maximum of 3 deg., wire rope service life is materially reduced. If these recommended fleet angles are followed, you will get a lot of extra service from wire rope.

Another worth-while maintenance precaution is proper alignment of sheaves. Proper sheave alignment seems like such a small matter that it may be overlooked in busy times—yet it can add greatly to wire rope service life.

To line up two sheaves properly, simply adjust them so that the rope runs straight from one to another and seats squarely in the center of each sheave groove. Even a slight misalignment can cause a great deal of wear between the rope and the shoulder of the sheave.

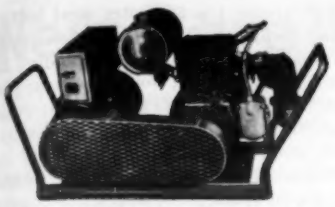
On certain types of work it is well to check sheave alignment from time to time during operation, to catch and correct any deviation from true alignment. For example, on timber-mounted drag-scrapers and slack-line excavators, the sheaves are apt to slip out of alignment due to a loosening of the mounting in the wood.

Mining machines—loaders, slushers and tugger hoists—should also be frequently inspected. Wire rope that operates in a mine is subject to severe wear under the best of conditions. Help the rope with maintenance precautions, wherever possible.

A third practical suggestion is to inspect the wire-rope system of clam-shell buckets for wobbly sheaves and to replace worn sheave bearings or worn axles where necessary. A wobbly sheave, or a badly worn sheave, can greatly reduce the service life of a wire rope.

Bethlehem Wire Ropes for all Purposes

BETHLEHEM STEEL COMPANY



The new Marvel generator set mounted on skids.

Generator-Lighting Sets

A new line of generator sets and lighting plants in three popular sizes—2,000, 3,000, and 5,000 watts—has been announced by Marvel Equipment Manufacturers, Inc., 224 S. Michigan Ave., Chicago, Ill. These plants can be equipped for direct current, as well as single and three-phase alternating current. They are powered by Wisconsin air-cooled engines, are mounted on skids and are complete in all respects.

These plants, which are tested at the factory before shipment so that they may be put into immediate service, are described completely in Bulletin GS-100 which may be secured direct from Marvel by mentioning this item.

Traffic Control Manual Has Emergency Edition

The familiar yellow-backed manual on Uniform Traffic Control Devices, published in 1935 and reprinted in 1937, has been superseded by a "War Emergency Edition" just completed by a special joint committee of the American Association of State Highway Officials, the Institute of Traffic Engineers, and the National Conference on Street and Highway Safety.

The new manual gives special attention to problems of emergency traffic movements, shortages of critical materials and blackouts. The first section covers traffic control devices for conditions of normal lighting and is essentially a condensation of the earlier manual with such modifications as are required by material shortages and special wartime traffic movements. Changes are recommended to make normal markings serviceable under blackout conditions, but compromise signs and signals are not recommended. Rounded letters, formerly optional, are now made standard for signs.

The second part of the manual covers traffic control devices for blackout conditions, based principally on War Department specifications. A dim-out supplement will be issued soon. Appendices include recommendations as to the availability and use of materials and reprints of War Department blackout specifications.

The manual may be secured from the Public Roads Administration, Washington, D.C., but as only a limited edition is available distribution is restricted to traffic officials and others having a direct connection with either the manufacture or installation of traffic control devices. Requests must indicate the need for the manual.

The Army Wants Ideas For Corps of Engineers

The Engineer School, Fort Belvoir, Va., is looking for usable practical suggestions from soldiers, sailors and from civilians on such subjects as bridges, camouflage, construction, design, machines, maintenance, maps, methods, roads, safety, surveying, traffic, and related subjects important to the work of the Engineer Corps.

This suggestion system, which is more than a year old, has already produced a large number of useful ideas, 11 per cent of the suggestions made having been approved and put to use. But more ideas are wanted and an intensive campaign has been started to promote further suggestions.

Civilians are particularly urged to send in their suggestions. No useful idea is too small to report, and every idea is judged by competent critics who consider the suggestion solely on its merits, unaware of its source. Many contractors and field engineers have discovered valuable short cuts, devices and methods of handling their work which would prove equally valuable to the Corps of Engineers. If you feel that your pet procedure for handling any type of construction or maintenance problem is applicable to the work of the Engineer Corps, send in your ideas. Remember that ideas win wars.

Your suggestions should be sent direct to The Engineer School, Fort Belvoir, Va. Just explain your idea or plan in a letter and include as many sketches or diagrams as you wish. Send in as many ideas as you can as a contribution to the war effort, and send them in now.

The A-to-Z Of Care For Asphalt Plants

The A-to-Z of operation and care of Simplicity asphalt plants is shown in a large illustrated folder, one photograph and one paragraph for each letter of the alphabet, which has been made available by The Simplicity System Co., Chattanooga, Tenn. The folder is based on the experience of a man who has operated many types of plants and who has prepared this information for plant operators after his experience with a Simplicity S-75 asphalt plant working 20 hours per day, 7 days a week, at an average rate of 100 tons per hour and 2,000 tons per day.

All asphalt plant operators will find these hints and helps of genuine value. They may be secured direct from Simplicity by referring to this item.

INSURE PROPER CONCRETE CURING

with

WILLIAMS SUB-GRADE PAPER

Write us for information on other Papers meeting Federal Specifications particularly UUP-536

WILLIAMS ROOFING PRODUCTS CO.

North Kansas City, Mo.

aggregate
ACCURATE CALIBRATION BY WEIGHT
bitumen
Only
WITH A BARBER-GREENE
Continuous Mixer
aggregate
bitumen
RESULTING SETTING LOCKED AND INTERLOCKED
The simple procedure illustrated above accounts for the untiring accuracy of the Barber-Greene. The desired quantity of each size aggregate is weighed, and the feeder gates locked at this setting. The bitumen metering pump is set for the desired ratio, and mechanically interlocked with the aggregate feeder. The Barber-Greene achieves POSITIVE PROPORTIONING in bituminous mixing. Feeding these accurately proportioned materials into the twin pugmill in a proportioned continuous stream, the Barber-Greene easily delivers a uniform mix, ton after ton—mile after mile. The Barber-Greene has set entirely new standards for short inexpensive moving and set-up time. Investigate this ingenious machine. Complete literature on request. Barber-Greene Company, Aurora, Illinois.
BG
BARBER GREENE

A parade of American road-building equipment, including a long line of Allis-Chalmers tractors, leaving Rio de Janeiro for the interior of Brazil to participate in that country's highway program.

ARBA Gets Clarification Of Transportation Tax

A general explanation of the application of the so-called "Transportation Tax" provided for in the Revenue Act of 1942 has been issued by Guy T. Helvering, Commissioner of Internal Revenue. After December 1, 1942, this law imposes a tax of 3 per cent of all amounts paid for transportation, except in the case of the transportation of coal for which the rate has been fixed at 4 cents a short ton.

Although the provisions of the tax are quite simple and clear as regards transportation in general, there are, nevertheless, many fine points when it comes to the movement of material on or about a construction project. Accordingly, the American Road Builders' Association has obtained an official ruling on the tax as it affects contractors working on construction jobs.

According to this ruling, the movement of material in connection with a construction project is subject to the tax, unless such movement is made by the prime contractor with his trucks (owned or rented) and labor. For example, if a prime contractor purchases crushed stone from a commercial quarry which delivers the stone to the site of the work, the payment for the transportation of the stone would be subject to the tax. However, if the prime contractor operates his own quarry and hauls crushed stone to the job in his own trucks, the movement of the material would not be subject to the tax. At the same time, the rule was laid down that the movement of property by scrapers or other allied earth-moving equipment is not transportation within the meaning of the statute.

On the question of contracts entered into prior to December 1 and cost-plus-a-fixed-fee contracts, the Commissioner held that the tax would apply in both such instances to all payments for transportation, regardless of whether or not such charges might be reimbursable.

Steel Products Available For Today's Construction

A new illustrated catalog of Laclede steel products for highway and building construction has recently been published by Laclede Steel Co., Arcade Building, St. Louis, Mo. The catalog is replete with helpful data to assist the design engineer in the economical use of steel and the construction man in the handling of these products.

For the highway field, the catalog lists plain and galvanized wire mesh for pavements in flat sheets up to 12-foot 6-inch wide lanes; welded bar mats; steel center joint; recess joint; center steel holders, stakes and supports; expansion joints; dowels; welded dowel mats; dowel bar assemblies; welded dowel spacers; plate dowels; bar supports and stakes; expansion-joint construction gaps and shields with stakes; contraction-joint steel cutters and strips; expansion and contraction-joint seals, joint fillers, center joint; edge moulding and curb angles; and, in addition, grader blades, sign posts, snow fence posts and regular fence posts.

Copies of this catalog will be furnished by the manufacturer on request to readers of CONTRACTORS AND ENGINEERS MONTHLY mentioning this review.

Deaderick Promoted

James H. Deaderick, Assistant General Parts Manager of the Caterpillar Tractor Co., Peoria, Ill., has been named a Vice President of that company, with administrative direction of the Parts, Service and Traffic Departments. Mr. Deaderick has been associated with Caterpillar since 1929.

USE TARPAULINS

Order Now!

QUICK SERVICE

NO PRIORITIES NEEDED

Speed construction. Protect vital materials in all sorts of weather. FULTON TARPAULINS will give you maximum satisfaction. Contractors Supply Dealers in every state sell the FULTON line. Specify SHUREDRY and FULTEX. FULTON products are good and prices are right. If your dealer can't supply you, write our nearest plant for catalog, samples and prices.

Fulton Bag & Cotton Mills

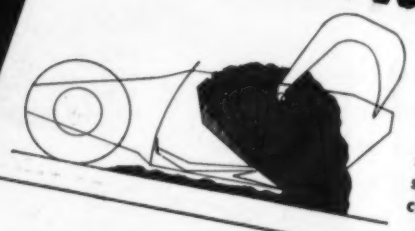
Manufacturers Since 1870

ATLANTA ST. LOUIS DALLAS

MINNEAPOLIS NEW YORK NEW ORLEANS KANSAS CITY, KAN.

Here's Why HEIL CABLE SCRAPERS Unload Faster and Cleaner with less cable pull

...TILTING FLOOR PUSH-OUT



About a third of the load rolls out by gravity, through high-opening front apron. Balance is ejected by moving the tilting floor upward and forward. Hinged tilting floor scrapes sides of bowl clean, hinged section at rear scrapes back sheet clean. Dirt has no chance to stick.

The unloading operation of a Heil Cable Scraper is a honey to watch. Your operator drives onto the fill at hauling speed — without the necessity of shifting gears, because the low line pull required to work the tilting floor does not stall the tractor motor. He spreads *all* the load smoothly and evenly at high speed — with no sticking in the bowl, even in wet, sticky soils . . . Such performance is possible only because Heil engineers have done a thorough job of designing a big-capacity cable scoop for speed, flexibility, and scientific weight distribution—to help you get bigger yardage at lower cost, along with a reputation as a successful operator . . . Use Heil dirt moving equipment, for maximum yardage per hour and maximum productive hours on the job; through easier maintenance, longer life, and simpler field repairs. Write for bulletins describing other Heil design features such as correct bowl design, scientifically located draft-pivot point, fulcrum-type lift, all-welded construction, etc., etc.

TILTING A LOAD REQUIRES LESS EFFORT THAN PUSHING IT

It requires less power to raise and dump a load than to slide it forward against friction. Tilting also gives greatest leverage at the start of the unloading cycle, when the load is heaviest—and a speed-up as the load is dumped, maintaining an even discharge.

View of empty bowl, showing tilting floor in practically vertical position at the end of the unload cycle.

★★★★★ The HEIL Company is engaged in all-out war production for Victory

THE HEIL CO.

GENERAL OFFICES: MILWAUKEE, WISCONSIN

New Parallel Road For Air-Field Access

State Route Between Two Air Fields Dualized; Heavy Traffic Hindered Haul to Fill

♦ TRAFFIC on an Ohio route at certain times of day was so heavy that the 395,000 cubic yards of borrow for a new dual highway was periodically brought to a standstill. The contractor built a construction underpass so that the 3-yard trucks and 8-yard Euclids hauling from the borrow pit could pass to the opposite side of the highway without interference. The idea was excellent, but the ramp down to the underpass had to take off from the end of a railroad bridge which gave a rather steep down grade for the loaded vehicles to negotiate in low gear. Operation on this grade proved so damaging to truck mechanisms that its use was practically abandoned. Loss of time was less expensive in this case than the wear and tear on irreplaceable parts. Had the hauling underpass been constructed 150 feet east of the location selected, the grade would have been better, but it would have entailed a bad turn off the railroad bridge which might have invited serious accidents.

The Job Set-Up

This dualizing of the existing highway for a distance of 5.7 miles between Wright and Patterson Fields involved the construction of a new 24-foot roadway almost all on new fill. In order to improve the alignment, the new section started at the right of the existing highway at the entrance to Wright Field, and then at Huffman Dam, about one-half mile distant, the new road crossed to the left and then back again to the right at the Officers' Quarters entrance of Patterson Field and thence into Fairfield.

The Borrow Pit

The 46-acre borrow pit, from which the 395,000 cubic yards of borrow for the embankment was taken, was located about ¼ mile from the highway south of Huffman Dam. The contractor worked two Lorain 75 and one Lorain 77 shovels in the pit, loading an average of 3,000 yards in a 13-hour working day during the summer when they operated from daylight to dusk. The hauling fleet consisted of six 8-yard Euclids and from ten to eighteen 3-yard trucks.

Placing the Fill

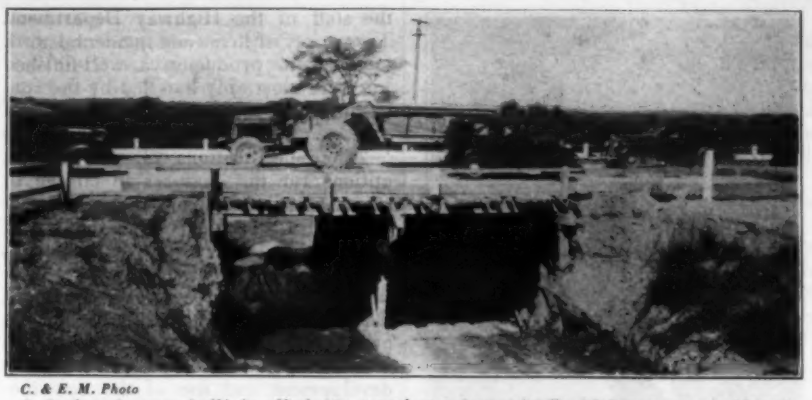
The new highway section, mostly on fill, averaged 12 feet high with 2 to 1 slopes and required the placing of four box culverts of 10 to 16-foot spans and averaging 80 feet in length. The small amount of roadway excavation plus the structure excavation for the culverts totaled 66,000 cubic yards.

To speed the placing of the embankment, the Euclids and trucks end-dumped their loads which were immediately spread by two tractor and bulldozer outfits, one an Allis-Chalmers Model K tractor with a Bucyrus-Erie bulldozer, and the other an International TD-18, also equipped with a Bucyrus-Erie bulldozer. The earth fill, spread in 8-inch layers, was compacted by a very heavy three-unit sheepsfoot roller pulled by a heavy-duty tractor.

Personnel

The contract for the construction of the 5.7 miles of new dual highway between Patterson and Wright Fields was awarded to Contractors Construction Corp. at Cincinnati, Ohio, for which Frank Spriggs was Superintendent. For the Ohio Department of Highways, Fred McCormick was Project Engineer.

Conservation of metal is vital to Victory. Take care of your equipment and turn in your scrap.



C. & E. M. Photo

A dual underpass built to eliminate crossing a heavy-traffic highway on a midwest access road job—not used because the approach grade was too steep.

Public Opinion and Roads

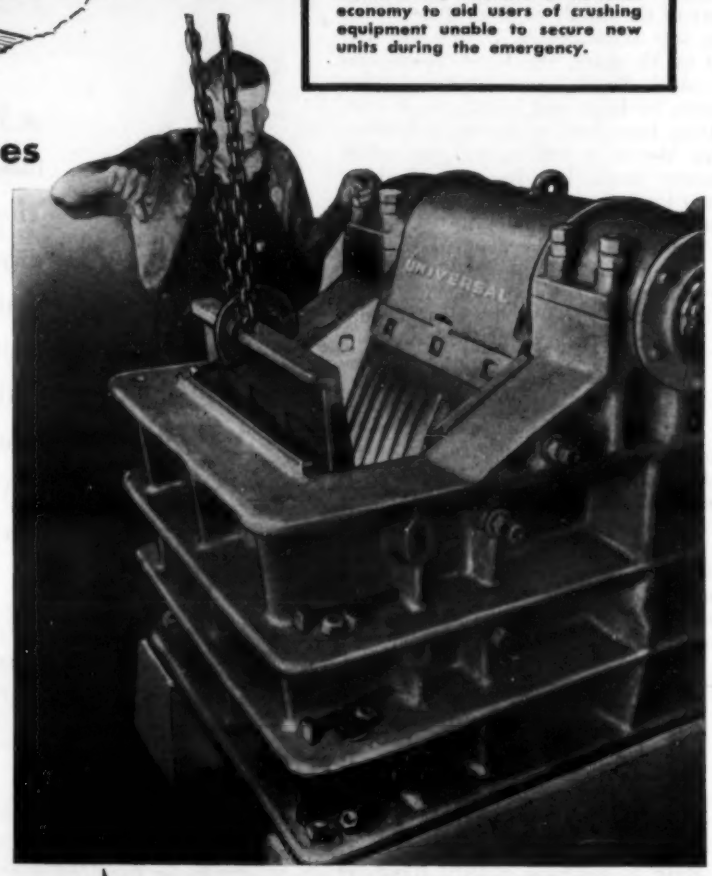
"I have something of a presentiment that post-war questions affecting highway matters will be more serious than most of us realize today. For that very reason I feel that it behooves us to go to greater lengths than ever before to gain and hold the confidence and understanding of the people. No reasonable and legitimate highway program has ever needed to fear the judgments of an enlightened public opinion."—*M. J. Hoffman, Commissioner, Minnesota State Highway Department, before A.A.S.H.O. convention in St. Louis.*

The Care and Feeding of Rock Crushers

No. 2 of a series of advertisements in the interests of national economy to aid users of crushing equipment unable to secure new units during the emergency.

Reverse Worn Jaw Plates for Maximum Service

Jaw plates are made reversible so they can be turned end for end when the lower end becomes worn. Jaw plates should be reversed as soon as they have become worn to a point of decreasing plant capacity—worn jaws will not grab and crush material. They cause material to slip and accelerate wear. Too, wear forms pockets at base of jaws preventing release of material and decreasing capacity. Cheek plates and wedges should be reversed, too (older models of equipment do not allow for this change) when jaws are reversed, for maximum efficiency and service.



UNIVERSAL ENGINEERING CORP.
Formerly the Universal Crusher Co.
620 C Avenue West
CEDAR RAPIDS, IOWA

WE ARE HELPING ALL WAYS!

We signed up early for the 10% War Bond Purchase Plan; we are building rock crushers and equipment for surfacing air base runways and we are army ordnance contractors.

Repair or Replace Jaws When Both Ends Are Worn

Most worn jaw plates can be salvaged by build-up welding and the use of filler bars. Only a few inches of jaw plate should be welded at a time to avoid warping the parent metal. Be sure to use a good manganese steel welding rod, applied in accordance with maker's recommendations.

We will be glad to recommend suitable welding electrodes, filler bars and best salvage welding methods on receipt of details covering type and make of equipment, nature of material worked and welding equipment available.

You boost production when you keep corrugations at the lower end of the jaws—you conserve vital metal when you build up worn jaws.

UNIVERSAL
CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADERROLLERS, PORTABLE ASPHALT PLANTS

STERLING QUALITY
STERLING PUMPS
BUILD FOR DEFENSE with STERLING PUMPS HOISTS and LIGHT PLANTS

Simple, Dependable, Rugged... the choice of leading contractors everywhere. Write for literature and prices.

STERLING MACHINERY CORP.

J. B. "Bob" Baker, Jr., Vice President of Baker Bros. Co. and Superintendent on the roadside-development job which won the Southern Section Award for Baker Bros.

Hole-Digging Unit Speeds Roadside Job

(*Continued from page 21*)

liam and J. B. Baker on a tract of land just east of Forth Worth, Texas. William Baker died in 1899, and in 1907 the business was incorporated with the members of the family of J. B. Baker being the sole stockholders. During the past 10 to 15 years, the Landscaping and Roadside Development Department has grown by leaps and bounds, such work having been done in Alabama, Arizona, New Mexico as well as in Texas, while nursery stock has been supplied to large landscaping and planting jobs all over the country.

The officers of the company are: J. B. Baker, President; E. L. Baker, Vice President and General Manager; J. B. (Bob) Baker, Jr., Vice President; and B. Barber, Secretary and Treasurer.

Contractor's Contribution

In nominating Baker Bros. Co. for one of our Roadside Development Awards, Jac L. Gubbels, Head, Roadside Development, and Melvin M. Rotsch, Senior Roadside Developer, District 15, Texas Highway Department, said:

"Baker Bros. Co. and the Superintendent, Bob Baker, are to be commended for their skilled use of new-type machines for roadside-development work and for their fine cooperation with the staff of the Highway Department. The variety of items and incidental work involved in producing a well-finished job were most ably handled by the contractor in a relatively short period of time.

"The specifications allowed certain options for the engineer in charge in regard to the acceptance of plant material. However, due to the interest in turning over to the state a complete and workmanlike job, the contractor voluntarily offered to replace all dead plant material before acceptance of the project."

The nomination further states that the development and use of the new machines for planting and sodding work, together with the efficient handling of the work and the congenial and cooperative attitude taken by the Superintendent and all his men, led to the successful completion of the contract.

Which bonds will you have—the bonds of defeat and slavery, or War Bonds for Victory and World Peace?

Frost Boil Damage Can Be Stopped Now

This spring you just cannot afford to let the damaging effects of frost heaves break up your roads. The trouble starts in the winter and shows up at its worst during the spring thaws. Frost heaving is caused by the formation of lenses of ice in the subgrade through the growth of ice crystals from capillary or free water in the subgrade.

If the subgrade has been properly insulated with a layer of gravel, or the use of perforated drainage pipe, you have licked the frost-boil menace. On the other hand, you may not have done anything about it and each year sent out your maintenance crews to add gravel to each frost boil to "strengthen" the subgrade. This year you won't have the men to do such work, but you can carry on by using calcium chloride to prevent the formation of those ice lenses.

Calcium chloride may be placed in holes about 30 inches deep and 7 or 8 inches in diameter made by earth augers at intervals of 4 feet in silt, 5 feet in clay and 6 feet in graded mixtures. The flakes of the chloride will dissolve and the solution will percolate through the soil in all directions, lowering the freezing point of the water in the voids and protecting the soil from the damage caused by frost heaves.

New Flooring in Barrels

An easily-troweled plastic flooring, which is shipped in barrels and applied over any concrete or wood floor to an average depth of ½ inch, is produced by United Laboratories, Inc., 16801 Euclid Ave., Cleveland, Ohio. This Plastic Rock does not splinter or crack and heavy loads improve rather than damage it. This material is particularly applicable for resurfacing hangar and warehouse floors, as it sets up hard over a week-end. It is furnished in dark gray, its natural color, and also in red, green and brown.

Complete information may be secured direct from the manufacturer.

DANDUX

Canvas Products

Built to exacting quality standards, of finer materials, Dandux Canvas Products have earned recognition and preference in the construction field during the past quarter century.

Their superior construction assures longer life, greater durability and service, yet they cost no more than the ordinary.

For your requirements of Tarpaulins, Covers, Bags; in fact, *anything* of canvas, consult our nearest office, and let us prove that the Dandux trade-mark assures you of greater value!

C. R. DANIELS, INC.

Manufacturers of Everything of Canvas

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CHICAGO Boston Buffalo Cincinnati
DALLAS Cleveland Detroit Newark
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CLEVELAND CLAY AND TRENCH DIGGERS

Take it Out in a Hurry!

Model CD8 Weight, 22 Pounds

Model C10D 29 Pounds

★ For loosening up hard ground or tough clay, these tools are real time and money savers. There are four types to choose from—a good digger for every condition. Model CD8 is recommended for average work, for caisson jobs, wall trimming, and similar digging. The TD8, with the extension handle, is just right when the operator has a chance to stand erect in his work. C10D, with the spade handle, and the C10E long-handle digger, are for the tougher job.

Model TD8 26 Pounds

Model C10E 36 Pounds

CLEVELAND BACKFILL TAMPERS

Ram all the Dirt Back Firmly!

Cleveland No. 5 Back Fill Tamper weighs 20 lbs. with butt.

★ Whenever construction work or paving must proceed immediately after back-filling, Cleveland Tampers will prove to be the answer to your problem. They ram the earth even firmer than it was originally, making it safe for your job to go ahead. And you won't have any dirt to haul away!

Bulletin 128 provides full information on the Cleveland Line of Diggers and Tampers. Promptly sent on request.

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Whitehall Machine & Tools, Ltd., Galt, Ontario

Cleveland Rock Drill Factory People are buying regularly U. S. War Bonds and Stamps.

THE CLEVELAND ROCK DRILL COMPANY

Subsidiary of The Cleveland Pneumatic Tool Co.

CLEVELAND, OHIO

Colombia Plans Highway Link to the Caribbean

According to a recent issue of *Foreign Commerce Weekly*, the U. S. Public Roads Administration has sent a highway engineer to Colombia to work with engineers of the Colombian Government and the Province of Antioquia in an investigation for a new route from Dabeiba, the northernmost point in South America reached by the Pan American Highway, to the port of Turbo on the Gulf of Uraba in the Caribbean. The distance between these two points is 80 miles.

This road is of the greatest strategic importance, as it will be Colombia's only highway to the Caribbean Sea. When finished, the road will permit direct passage by an overland route from the Pacific port of Buenaventura to Turbo, which is located on a wide bay capable of handling deep-draught vessels, on the Caribbean. It will be possible to transport goods to and from this port over more than 10,000 miles of the South American section of the Pan American Highway and its principal connections.

After the preliminary survey is completed, a credit may be obtained in the United States with which to construct this important 80-mile link in the shortest possible time.

Ball and Roller Bearings, Their Proper Lubrication

To aid the user of ball and roller bearings in the care of these important anti-friction devices, the Lubriplate Division of Fiske Brothers Refining Co., 129 Lockwood St., Newark, N. J., has prepared a really helpful bulletin on bearing installation, care and lubrication. The type of housing provided by the manufacturer determines whether an oil or grease type lubricant should be used.

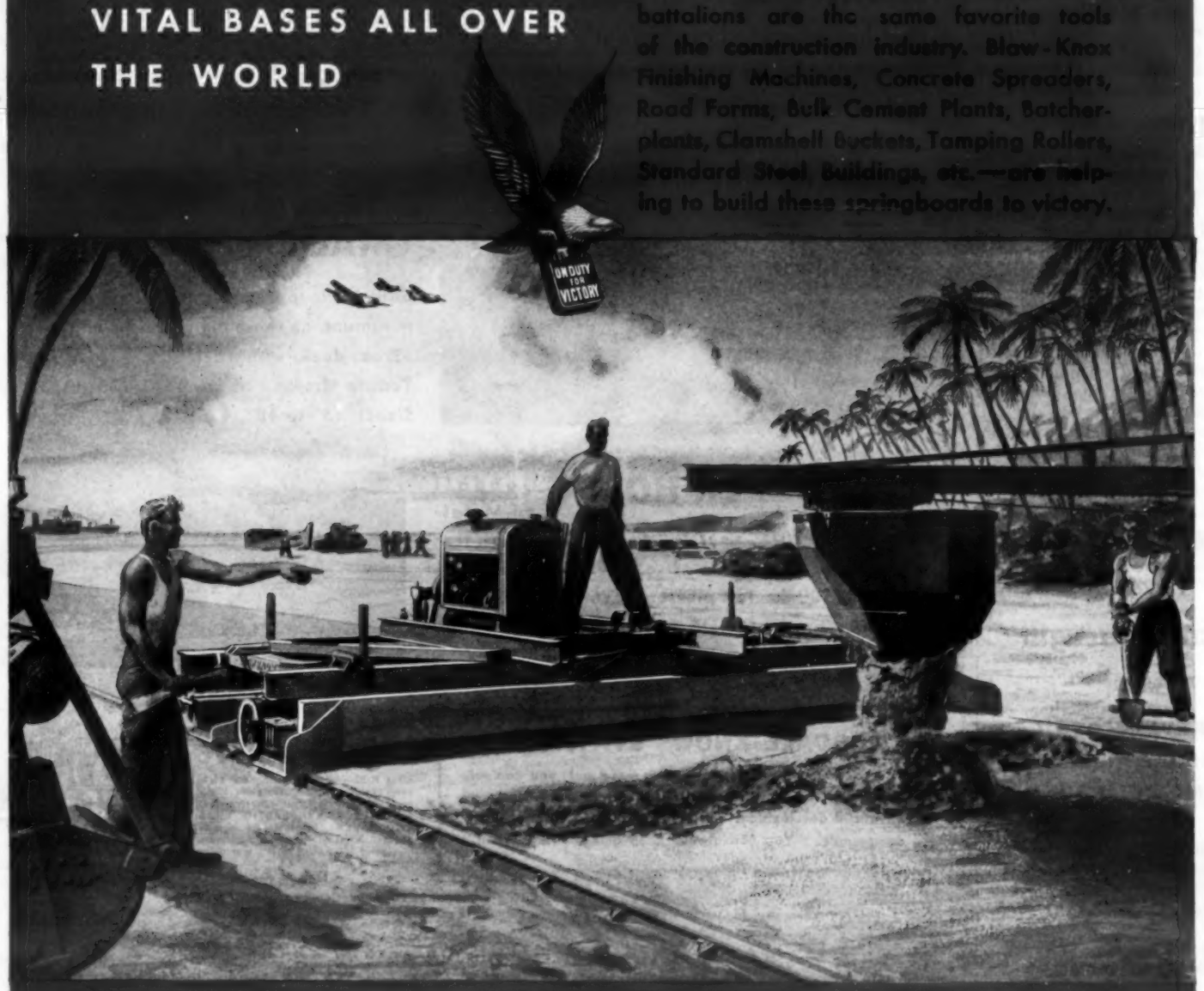
Bulletin No. 1-43 will help the user to make one bearing outlive two at a time when longer life and increased service are vitally necessary. A free copy of this bulletin will be sent by the Lubriplate Division on request to those mentioning this item.

Roosts for Warbirds

BLAW-KNOX EQUIPMENT HELPS CONSTRUCTION BATTALIONS BUILD VITAL BASES ALL OVER THE WORLD

Picked men and picked equipment are today building roads and airfields and other structures in many a far-flung American outpost.

The tools of America's construction battalions are the same favorite tools of the construction industry. Blaw-Knox Finishing Machines, Concrete Spreaders, Road Forms, Bulk Cement Plants, Batcher-plants, Clamshell Buckets, Tamping Rollers, Standard Steel Buildings, etc.—are helping to build these springboards to victory.



BLAW-KNOX

BLAW-KNOX DIVISION OF BLAW-KNOX CO.
2067 FARMERS BANK BLDG. · PITTSBURGH, PA.
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Representatives in Principal Cities

Longer Crusher Life Through Proper Care

Despite Heavy Castings And Bearings, They Do Wear Out; Ways to Keep Them In Efficient Operation

✦ BECAUSE of the very nature of the work they do, rock and gravel crushers are built rugged with comparatively thick metal sections. In recent years increased use of alloy steels and ingenious redesigning have reduced their overall weight but, compared with most other construction equipment, crushers tend to run heavy.

Uncle Sam needs crushed rock and gravel for airports, strategic roads, reinforced concrete pipe, war plants and housing, and scores of other purposes. But he also needs the ferrous and nonferrous metals that are needed to make new crushers and replacement parts. A partial solution to the lack of materials for making new equipment is to make present equipment last longer through proper use and care. There was a time when contractors, highway departments and commercial plants paid more attention to production than to a long service life. Today it's different—prolonging the life of equipment is paramount. Leslie S. Hackney, Sales Manager, Universal Engineering Co., Cedar Rapids, Iowa, offers the sound advice below on how to reduce breakdowns and to secure longer service from your crushers.

Proper Feeding of Materials

Avoid feeding stone that is too large for the crusher opening as it is certain to increase the wear and to cut production. It will bridge the jaws, prevent nipping, and choke the mouth of the crusher so that no new material can be fed. Also the job of removing an oversize rock is time-consuming. Never use a sledge hammer to break a large rock in the crusher while it is running.

It is best to avoid dumping directly into the crusher feed opening as too large stone may be in the bottom of the load or hidden from view and will choke the crusher. An apron or conveyor feeder dumping onto a grizzly or screen is preferable because it provides a steady feed and by-passes the fines.

A dump box or ramp also helps solve the production problem. Material can be raked or shoveled into the crusher opening and pieces of stone too large for the crusher opening may be removed and broken up before feeding. With such a set-up, excess clay, which has a tendency to retard production and causes slippage, can be removed, and tramp iron, which is so detrimental to crushers, can be picked out.

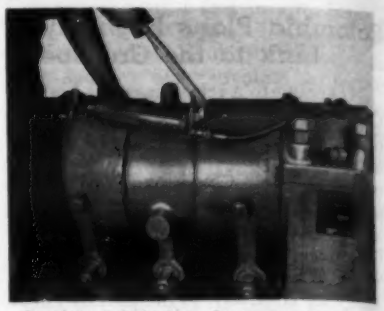
Reverse Jaw Plates

Most overhead eccentric-type and many other crushers have reversible jaws which can be turned end for end when the lower portion becomes worn. When jaw plates have become worn to a point of decreased plant capacity, they should be reversed immediately. Worn jaws will not grab and crush material. This causes material to slip and accelerate wear and often has a tendency to form a pocket in the base of the jaws which retards the release of material.

Worn jaw plates can be restored by build-up welding. Although there are some hazards connected with building up worn jaw plates, it can be done by skilled workmen using a good welding rod and manganese-steel filler bars. More and more quarry and pit operators are resorting to this method of salvaging worn jaws. Precautions should be taken to avoid overheating and warping the base metal. Jaw wedges and cheek plates should be reversed, too, so as to distribute wear.

The Importance of Lubrication

Lack of lubrication can cause costly bearing failures, and bearings are made of vital much-needed alloys. Make it a practice to inspect the bearings often, at least four times daily where the crushers are equipped with bronze bearings and at least daily with roller bearings. Check



Crusher lubrication is now more important than ever. Lack of grease causes costly bearing failures which not only hold up production but needlessly use up vital metal.

them for overheating. Wipe lubricating vents with clean rags before putting in new grease. They can be flushed with a thin oil such as SAE 10, but do not use kerosene on bearings. Use only clean containers to store oil, and don't keep lubricant containers near crushing operations as float dust is very penetrating

(*Concluded on page 58*)

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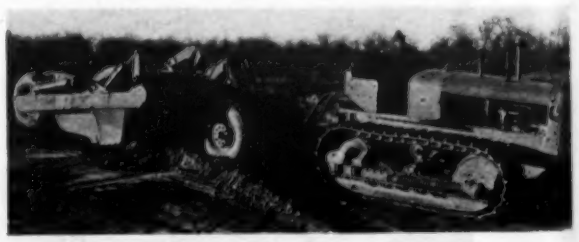
"KNOW HOW"? Yes, Goodall has it in good measure . . . accumulated in a factory that has operated continuously on the same site at Trenton for nearly three-quarters of a century . . . in good times and bad . . . in peace and war. Today, despite shortages and restrictions in critical materials, contractors KNOW that the name Goodall on hose, belting, boots and clothing still means highest obtainable quality and the assurance of maximum reliability and service.

GRADER BELTING "'76 Duration" Brand. Built to keep delays due to belt replacements at a minimum, on those big earth-moving jobs. Made of 32 oz. duck, with 16-19 lbs. friction between plies. Tensile strength of cover: 1,700 lbs. to 2,200 lbs. Sizes: 18" to 48", 4 ply.

BULLDOZER HOSE "Goodall Semi-Metallic." Style 110-X, sizes ½" to 1¼", 2300 lbs. test pressure per sq. in. on 1" size. Style 125, sizes ¾" to 1½", 8500 lbs. test pressure per sq. in. on 1" size. Combines great strength and durability with good flexibility.

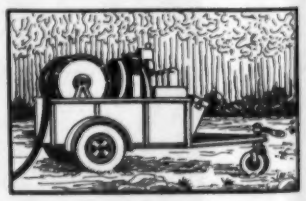


GOODALL KNOWS SYNTHETICS

As your present rubber equipment wears out, you can rely on Goodall to furnish replacements representing the most advanced development and application of synthetic rubber compounds. "You can always keep going with Goodall."

FIELD SERVICE GREASING HOSE

Style R-32—All Synplastic. For portable greasing units. Durable, kink-proof "Newtype Cord" construction, with BLACK SYNPLASTIC TUBE AND COVER. Light weight easy to handle. Sizes: 1" to 1½", maximum lengths of 150 feet, 2" to 4", maximum lengths of 50 feet.



Have you been receiving our "Rubber Conservation" bulletins? Write our main office . . . there is still time to get the complete series.

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GOODALL

RUBBER COMPANY INCORPORATED

Asphalt Construction During Cold Weather

A construction procedure recommended for placing hot-laid asphaltic mixtures in freezing weather has been prepared by The Asphalt Institute, 801 Second Avenue, New York, N. Y. It features an extended progress chart which shows in detail, with daily and hourly tonnage figures, just how paving was continued throughout eight months at an important Naval Air Station in New England, with temperatures ranging down to 5 degrees F. This publication, entitled "Asphalt Construction in Cold Weather", may be secured direct from the Institute by referring to this review.

The Institute has also recently issued its newly adopted Construction Specifications MP-2 "Modified Penetration Cut-Back Asphalt Surface Course", which is also available on request.

Better Lung Protection

A new air-filtering cartridge for its R-1000 respirator has been announced by the American Optical Co., Southbridge, Mass. The new Type AD cartridge protects lungs against a combination of all types of dusts, including toxic, pneumoconiosis-producing, and nuisance dusts. The face piece of the AO R-1000 respirator contains a compartment into which a cartridge can be inserted, seven of which have now been designed for interchangeable protection against common respiratory hazards faced by industrial workers. Cartridge Type A is for protection against dusts in mining, quarrying, tunneling, in addition to the new AD cartridge.

Complete information on these respirators and cartridges may be secured direct from the manufacturer by mentioning this item.

Poster Wars on Waste

As a contribution to the war against waste, the Air Reduction Co. has prepared for distribution an effective poster in two colors, 17 inches wide and 22 inches deep, urging the economical use of oxygen. Copies may be obtained by writing to G. Van Alstyne, Air Reduction Co., 60 East 42nd St., New York City, and mentioning this publication.

GIVE THE ENGINE A BREAK!

WHATEVER type of "Caterpillar" Diesel equipment you operate, it's powered by a great engine. Thousands of veteran "Caterpillar" units are doing a heroic job in these trying times—carrying on with sturdy efficiency long after their ordinary life span.

It's the *extra* qualities built into all "Caterpillar" Diesel Engines that are proving their worth today. They're simple, dependable, as nearly free from operating adjustments on the job as possible. But if you expect to get the utmost out of your engine, it's up to you to do *your* part.

First of all, you should read the instruction book and re-read it

Lubrication is important to engine life. Use the correct grade of oil, and change the oil and filters at proper intervals, as indicated by the hour-meter.

Keep the fan belt properly adjusted.

See that the cooling system is tight, and put in enough anti-freeze to give positive protection in winter weather.

Keep the air-cleaner clean, and remember it needs more attention if dust conditions are bad.

Keep the clutch properly adjusted to avoid slippage, and don't overload the machine oftener than is absolutely necessary.

When repairs or special adjustments are needed, your "Caterpillar" dealer is ready day or night to help keep your engine working. He is equipped for every type of service.

He'll install new rings or recut piston ring grooves and put in wider rings if grooves are badly worn.

He'll etch the cylinder liners, removing gum and glaze.

He'll replace bearings when they are worn, and he is equipped to recondition a worn crankshaft and fit it with new bearings, saving many pounds of war-needed metal.

Have him test your fuel injection system to see if it is functioning properly.

The "Caterpillar" dealer is the best friend your "Caterpillar" equipment has. Wartime conservation of power and materials is his job. You can always count on his sound advice and reliable service.

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

TO WIN THE WAR: WORK—FIGHT—BUY WAR SAVINGS BONDS!

Ingenuity Features Texas Highway Shop

(*Continued from page 27*)

wheels. As a portable office was needed for the resident engineer, a 16 x 18 portable structure was on the books of the accounting department, and sure enough there it was being framed in the yard.

Have you seen the old tin can over the top of the exhaust muffler on tractors parked by the side of the road? Surely, and how many times, just when the protection of that tin can to prevent the rain from entering the vertical muffler was needed, was it missing? One of the mechanics designed and built a muffler that does its normal job and at the same time protects the engine from rain running down the muffler into the casing and causing rusting. The secret, told us with justifiable pride by the mechanic himself, is that this muffler has two baffles for muffling inside and the bottom of the muffler section has holes for the water to drain out and not go into the engine. Rain drops coming into the exhaust pipe hit the outer muffler and if they do run through some of the holes they pass down the inside of the outer muffler and drain through the holes in the bottom. The inner muffler acts as a safety baffle in case the drops do get by the first muffler. There is no chance of getting all the way to the engine.

Another example of ingenuity was a cabinet made from scrap metal and wood and just being put into service August 1. The stock inventory had far outgrown the original cabinet provided, as the number of items, each represented by a card, had multiplied many times. The new cabinet is on four caster feet set in machined caps welded to four well-shaped legs which in turn are welded to the pipe post carrying the tray for the cabinet. The cabinet itself is in two parts, each covered with a well-polished door. The cards are placed one way in one side and the opposite way in the other side. The value of this is that the cover of one side acts as a desk for the accountant or stock-room man when he is using a card from the other side. The cabinet is set on a Timken bearing so that it revolves easily and a felt retainer prevents dust entering and jamming the ball bearings.

In the shop they were up against the problem of replacing a pulley for a rock crusher. It just could not be bought. A few minutes' search and the problem was solved. There were some old I-beams with good heavy webs in the yard, just the thing for the face of the pulley and thick enough to permit machining to give a crown to the pulley face. A piece the right size was cut out, sent to a local foundry to be rolled into a 12-inch cylinder, and then welded into the shape permanently at the District shop. The old hub of the rock crusher pulley was welded inside and then the face turned on the lathe to the proper crown. It has an 8-inch face and is offset for easier operation.

These are just some of the devices made by the mechanics in the shop to promote easier work and faster manipulation. One more comes to mind. A Littleford single-wheel power roller proved to be a little too much to be managed by the light-weight man responsible for its operation. He spoke of it to the mechanics who in a few days developed a novel device with a small wheel under the tongue for steering the roller by a small hand wheel, whether the roller is in towing or rolling position.

C. & E. M. Photos

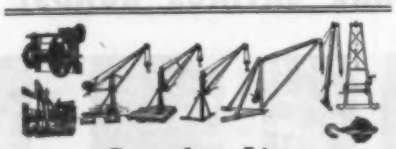
At right, the stock clerk preparing a requisition for the delivery of repair material to a shop mechanic, and above, the timber rack for tool steel in the well-filled stockroom of District 2, Texas Highway Dept.

The District Shop

Most of these things are made in the District Shop, so a look at it is warranted. The shop measures 60 x 80 feet with a stock room of the same size immediately behind it in the same building. On the north side of the shop is a continuous bench with a few more of the devices fixed up by the mechanics. First is a soldering outfit, then an air hose and water tank of sufficient size to permit testing the largest gas tanks, tires and radiators with air and water. Next to this is a cold bubbler fountain that had special interest as the temperature on a nearby thermometer was 105 F. A coil of pipe made in the shop is immersed in a tank of ice, giving ice water practically continuously. Next to this is a large ice box for storing all the ice needed for a day for the shop fountain, the office fountain, and for field parties.

Two air conditioners overhead make the shop much cooler than the outside

(*Continued on next page*)



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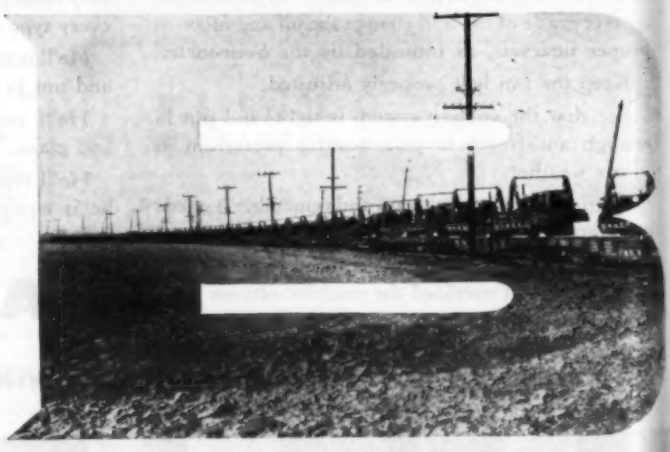
Yes, these fighting Free Frenchmen know a victor when they see one. They were licked once and they know what it took to do it — and they know we've got mechanization that will make their goose-stepping conquerors say "Uncle."

If you could see those Baker Hydraulic Bulldozers smoothing out North African sand dunes for airports, making camel trails into jeep roads, filling bomb craters at air bases and removing debris in age-old Islam villages before the bomb fragments have had a chance to cool—you, too, would agree, "Victory is in the bag."

This war is more than tanks, guns and ships. On every front, Baker Bulldozers with their direct lift and tremendous hydraulic down pressure—not merely dependent on gravity or weight of blade—are leaving no stone unturned to insure a speedy victory. Send for a copy of "Unsung Heroes of War."



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585 Stanford Ave. Springfield, Ill.

Baker Hydraulic Bulldozers and Construction Equipment have gone all-out for global war. Every unit leaving our plants is directly engaged in the war effort.
We have evolved wartime production methods that will bring you better Bakers at lower cost after the war.

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The Modern Tractor Equipment Line for
EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE

Many Novel Devices In Texas Shop Set-Up

(Continued from preceding page)

air. These were made in the shop and consist of metal containers filled with excelsior into which water drops at a slow rate and through which the air for the shop is forced by a pair of electric fans.

Back to the bench. There are four sets of large cabinets with doors to hold parts and tools for jobs at hand. Two heavy vises are attached to the benches at convenient intervals, and a Rottler Boring Bar Co. adjustable cylinder-boring machine is stored in one of the cabinets in a special section built for it.

Set up near this point was a job on which the mechanics were working at the time. There had been some trouble with the heavy-duty engine at the crushing plant. All too frequently its cylinders needed reboring and were badly scored. The reason was found in the air cleaner which was too small for the excessively dusty atmosphere in which the engine was working. A new and larger air cleaner was built from a Gulf lubricant can to serve as a primary air cleaner ahead of the original unit.

At the end of the shop is a large locker and wash room and next to it a miscellaneous storage room. Behind these is the stock room. A revolving pillar crane at the end of the shop was built by the men and is most serviceable in handling large engines and other heavy parts. It is made of an old I-beam for the pillar and an I-beam for the 16-foot boom which carries a 5-ton Yale triple-block chain hoist.

Next in order as one walks around the shop is the work-order board where the standard forms used in the Texas Highway Department are placed as jobs are allotted to the mechanics. Form 170 is used to charge labor only for repairs to any piece of equipment, while Form 190 charges materials to a work-order number and equipment number. These two get together in the store-room office behind the work-order board and finally are charged in the accounting office in the main building. Adjacent to the work-order board is another on which typed cards representing each piece of equipment owned by the District are located according to the location of the equipment in the field or shop. This is set up by counties, office, shop and NYA so that at a glance the present location of the machine is noted in a moment.

The major part of the shop is open space where the equipment can be brought in for overhaul. The most important part of the shop is the machine shop located on the south side of the repair shop with a pipe rail to set it apart from the open working area. Within this area are the major machines for handling the important work, including a Sebastian 12-foot lathe; a test stand made in the shop for relays, magnetos, and generators; a Delta power grinder and buffer; a Buffalo Forge Co. 25-inch

(Continued on page 63)

WILL YOU SIGN THIS LETTER?

Seaman Motors,
Milwaukee, Wis.

Gentlemen:

I have heard that your engineering staff has prepared a most comprehensive and practical book on SOIL STABILIZATION.

This book, I believe, covers techniques used in soil-cement, bituminous, calcium-chloride, sand-clay and other processes, - with emphasis placed upon military airport and runway construction.

I am told that highway maintenance and repair are also stressed - which are matters of great interest, particularly this year.

Please send me the book.

Yours very truly,

Hundreds of contractors, — owners of SEAMAN PULVI-MIXERS, — who are engaged in soil stabilization work — are profiting from this new book . . . Send for your free copy today!

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SPEED WAR WORK

Clip the coupon for your copy of the NEW bulletin on
BLACKHAWK HYDRAULIC EQUIPMENT

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HYDRAULIC HAND JACKS

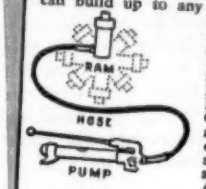
No need to assign several men to each jacking job — one man can operate any Blackhawk Jack — even the brute 50-tonner! That's only part of the big story on why Blackhawk 3, 5, 8, 12, 20 and 50-ton Jacks can help you beat those schedules!

GAUGE JACKS

The most practical, economical and portable field testing equipment available. Tell whether materials, soil or structures can "take it."

PORTO-POWER REMOTELY CONTROLLED JACKS

Something revolutionary in Hydraulic Jack design. Works in all directions! One unit can build up to any practical length — eliminating need for miscellaneous jacks and dangerous, cumbersome blocking up. Sure it lifts — but Porto-Power also PULLS, SPREADS, CLAMPS, BENDS and PRESSES! Hundreds of amazing uses around every construction project. Available with 7, 10, 20 and 50 tons of power.



PIPE BENDERS

Stop worrying about getting factory formed bends and elbows, or losing time in "belly wrestling" pipe. Low-cost Blackhawk Benders handle up to 4" pipe.

Mail This Today

BLACKHAWK MFG. CO.
Dept. P1833, Milwaukee, Wisconsin

Rush your new Hydraulic Equipment Bulletin V-43 to us.

Name.....

Company.....

Address.....

City and State.....

Igloo Construction For Ordnance Depot

(*Continued from page* 11)

Crushed gravel, 1½ to ¼-inch	2,475 pounds
Sand	1,800 pounds
Cement	672 pounds

This batch is equivalent to 5½ bags of cement per cubic yard and the 7-day breaks of cylinders gave 2,600 to 3,000 pounds regularly. Hauling from the batching plants were thirty-seven batch trucks, five 3-batch and thirty-two 2-batch trucks.

The third batching plant which was used to furnish material for building foundations and curbs as well as other small needs was a Lang manually operated plant which received its aggregates by a lateral conveyor and used cement in bags.

Mixing Igloo Concrete

The plant for mixing the concrete for the igloos was novel in that it had high-production possibilities and at the same time was portable. A pair of Rex dual-drum pavers were set up as a semi-permanent installation to furnish the concrete from a central point for a group of 100 igloos on each side of the main road, with the plants in the 1,400-foot neutral area between the igloo areas. The pavers were set on heavy wood platforms with 10 x 10-inch posts and 1 x 8-inch lumber nailed diagonally to act as sway bracing. An earth ramp permitted the batch trucks to deliver the batches directly to the paver skips on the platforms which were spaced about 100 feet apart in the first installation, but farther apart on later set-ups so that the batch and hauling trucks would not interfere and cause delays resulting in reduced concrete production. The paver booms were held slightly above horizontal with the buckets over steel storage hoppers from which the 2-yard bottom-dump concrete buckets were filled with 1½ yards per load so as not to overload the long-boom cranes that handled them at the igloos. The hauling trucks for the buckets drove under the loading hoppers with the two or three Heltzel or Gar-Bro 2-yard buckets. The bottom of the pits, directly under each loading hopper, was paved with concrete so that the trucks would not mire and the sloping roads to and from the pits were maintained by an Adams No. 511 diesel grader. Water for the pavers was brought from the reservation supply by temporary lines carried through the center of each group of igloos with branches to the paver points. The bucket hauling fleet consisted entirely of 10-wheel trucks so as to provide ample traction for all kinds of conditions at the pouring sites.

The batches were mixed in the pavers for 45 seconds in each drum so that a batch was delivered by each paver every 45 seconds. The first batches delivered for pouring the barrels of the igloos were "sweetened" with three extra bags of cement per batch to give added strength to the concrete at the spring line. The concrete crews at the pavers consisted of one man dumping the batches at each paver, a paver operator for each and a grease man for the pair of pavers, one man dumping the loading hopper at each paver, while the truck drivers were given the responsibility of sprinkling the buckets each trip so that the grout left on the sides of the buckets would not dry and build up or cause sticking of later batches.

Igloo Forms and Assembly

The igloo forms were the standard steel forms used for all igloos of the barrel type at the various ordnance depots throughout the country. At this Depot the forms were moved very rapidly, in large numbers and with considerable speed by the use of large lumber carriers on four wheels, the forms being stacked on platforms which were easily picked up by the carriers.

(*Concluded on next page*)

TORO
POWER MOWERS
All Over the World
TORO MANUFACTURING CORP'N.
MINNEAPOLIS, MINN.
HEADS UP FOR VICTORY!

HEADING HOME with CONFIDENCE !

OFFICIAL U. S. NAVY PHOTO

It is difficult to realize that the influence of HUBER equipment reaches far out to sea. It is true, however, for bombers on patrol must return to their home bases . . . and HUBER Speed-Scoops, Rollers, and Bulldozers are doing a real job of keeping home bases fit for our fighters. This is one of HUBER'S many contributions to the war program. » »
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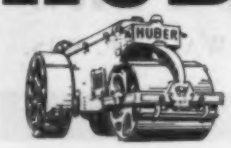

ROLLERS ● BULLDOZERS

For 20 YEARS
D-A LUBRICATION
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INDIANAPOLIS

Pouring and Curing Concrete in Igloos

(*Continued from preceding page*)

With the large number of sets of forms already at the Depot the contractors were still not able to reach the capacity of their concreting plant. Therefore, forty-six additional sets of inside and twelve sets of outside forms, as well as extra ribs, were being shipped to the Depot from other depots already completed. The forms were stripped in 16 to 24 hours and the ribs left in place with the inner forms for 36 hours.

Pouring an Igloo

For pouring the igloos the concrete buckets were lifted directly from the trucks by Koehring or Lima cranes, one at each igloo being poured. When consideration was given to having two cranes for each igloo to increase the speed of pouring, so that the existing outside record of twenty-four igloos in 24 hours might be surpassed, it was found that the excessive number of men required for handling the amount of concrete that would be delivered would not leave room enough for the convenient operation of the cranes.

Each crane with its 60-foot boom swung the bucket to the concreting crew who quickly emptied the low-slump concrete directly into the forms. The third form from the bottom was omitted during the start of the pour so that the concrete could be delivered easily and also the vibrators operated in close contact with the concrete as delivered. Power for the Mall vibrators was provided by a small Kohler electric plant located in front of each igloo as it was poured. Each crane was equipped with a special safety hook so that it could not unlatch during the handling over the igloo. This latch fitted one type of bucket used perfectly and for the other it simply rested under the bale.

The concrete crew for pouring consisted of the foreman and the following: one bucket spotter on the ground, two hook-up men on the truck, two vibrator men with vibrators and two motor carriers for the vibrators, three men on clean-up, two of whom held a baffle beneath the section being poured so as to prevent any spillage over the forms, and five men placing and dumping the bucket into the forms.

Curing and Covering

The front of the igloos was covered with a paraffin-base material for curing as it did not discolor the concrete, and the barrel was covered, immediately after stripping the forms, with a cut-back asphalt and later waterproofed with a cold cut-back asphalt and paper.

For covering the igloos to fulfill the technical designation of "underground", 2 feet of earth was piled over each barrel. This was done by pushing the material from the areas immediately around the igloos up onto the bottom half of the barrel with tractors and bulldozers while the top cover was placed with a dragline. By taking the cover material from close to the igloo a low area was created for easy drainage.

C. & E. M. Photo

The larger of the two Cedarapids crushing and screening plants furnishing crushed gravel and sand for igloo concrete.

Personnel

The construction of the large number of igloos at this mountain-state Ordnance Depot was done by lump-sum contract under the direction of the U. S. Engineer Department. In the interest of national security, reference to the location of and the personnel connected with U. S. Army construction is omitted.

Bulk Cement Unloaded From Box Cars Faster

Speedier unloading of bulk cement from box cars has been the hope and ambition of many construction superintendents and their foremen for many years. Where the standard bulk cement freight cars are used, unloading has not been a problem; but with the increasing use of lined box cars for shipping bulk cement new methods and devices have been sought to facilitate and speed up the work.

The Butler Carscoop, designed for speedy unloading, consists of a short-wheelbase tractor with a front scoop of 10 cubic feet capacity which can dump 4 feet, 6 inches above the floor level. The folded transmission, which is the secret of the short length of the Carscoop, aids in the easy maneuvering of this gasoline or electric-powered machine, giving it a 6½-foot turning radius.

A complete description and specifications of the Butler Carscoop will be found in a new piece of literature which will be forwarded promptly by the Butler Bin Co., Waukesha, Wis., to those mentioning this descriptive text.

No highway department should be taken by surprise at the end of the war. Make detailed plans now and buy right-of-way, as is being done in Vermont.—
Thos. H. MacDonald, Commissioner, P.R.A.

NOTES on AIRPORT CONSTRUCTION and MAINTENANCE: Buckeye Spreaders SAVE time AND materials

BECAUSE it puts exactly the required amount of material just where it's needed, the Buckeye Spreader eliminates wasted time and material. One pass and the course is laid *right*—no time lost patching thin spots, no material wasted.

High accuracy (users report as high as 98%) is but one feature of this versatile spreader; it handles everything from a fine sprinkle of sand to a 1½" layer of stone—or up to a 6" course with strike-off attachment.

Write now for performance-checked *facts* about this ideal airport construction and maintenance worker!

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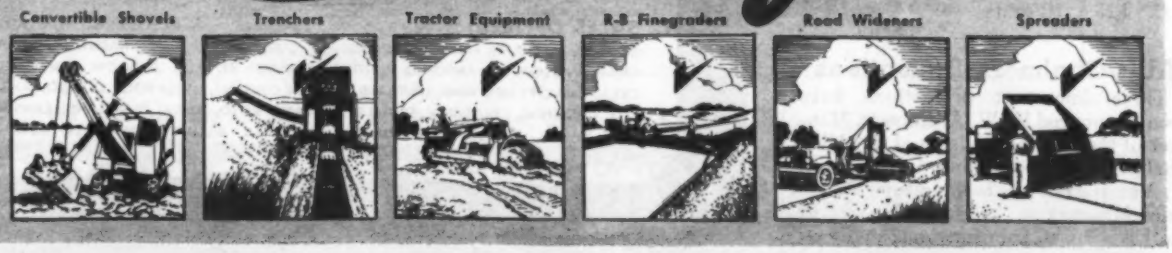

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Safety on Highways In Blackout Areas

Can motor traffic operate safely during dim-outs or blackouts at 20 miles per hour over the highways under your jurisdiction? Are these roads equipped so that drivers who do not know them will be guided safely under dim-out or blackout conditions? If you can answer these questions with an honest and hearty "Yes" without reservation, then you are one of very few such engineers who can.

In the December, 1942, issue of *Public Roads*, published by the Public Roads Administration, is a 20-page report on various types of highway signs and markings for blackout conditions, providing extended blackouts become necessary. The report, by George J. Fisher, Assistant Traffic Engineer, Ohio Department of Highways, and O. K. Normann, Highway Engineer-Economist, Public Roads Administration, is the result of a study conducted during blackout conditions, using passenger cars equipped with lights approved by the War Department on trips over highways on which a large variety of standard and special signs and markings were installed.

The results show that a highway, either urban or rural, can be marked so that vehicles equipped with the approved blackout lighting system may be operated with comparative safety, by drivers with a reasonable sense of responsibility, at speeds up to 20 mph. The need for most types of signs is reduced during blackouts, but the need for marking center lines and hazardous objects within the roadways is accentuated. Signs, to be effective, must be either illuminated or reflectorized and mounted with their legends within 18 inches of the roadway elevation and as near the roadway as practicable. Pavement markings, to be effective, must be reflectorized.

The published report in *Public Roads* contains complete descriptions of the signs and tests, with copies of the questionnaires used, the ratings of the various signs, their mounting, pictures of the signs, a complete description of the types of center lines tested, and the results. Copies of the December issue of *Public Roads* may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D.C. Price, 10 cents.

Allis-Chalmers Promotions

Three important promotions have been announced by W. A. Roberts, Manager of the Tractor Division of the Allis-Chalmers Mfg. Co., Milwaukee, Wis. A. W. Van Hercke has been advanced from Sales Manager to Assistant Manager of the Division, to coordinate all engineering and development work. A. F. McGraw, former Sales Promotion Manager, is now General Sales Manager, directing industrial and agricultural sales of the Tractor Division, while R. A. Crosby of the Advertising Department, temporarily loaned to the Salvage Section of the WPB, will be Advertising Manager.

Plastic Name Plates

Since brass, copper or bronze name plates are out for the duration for marking machinery and metal equipment of every kind, contractors and highway departments, as well as manufacturers, will be interested in the new Durashield, a product of Plastic Fabricators, Inc., 500 Sansome St., San Francisco, Calif. Durashield is produced by a lamination process to meet minimum Navy specifications. The center sheet upon which the wording is printed is an opaque cellulose acetate plastic 0.010 inch thick. On each side of this is laminated a transparent acetate plastic 0.020 inch thick, making a finished product measuring 0.050 inch thick. The transparent outside allows a clear vision of the name or direction printed on the center and as it is laminated in a solid plate it resists wear and remains a solid unit.

This new product can be die-cut, stamped, drilled or otherwise shaped to meet any specification as to size. It is fire-resistant, withstanding temperatures of 200 degrees F. Complete information on this product may be secured direct from the manufacturer by mentioning this item.

The wartime burden of the post offices throughout the country is very great. We are making every effort to have your copies of CONTRACTORS AND ENGINEERS MONTHLY *reach you on time. If there are delays, however, we hope you will understand the reason and grant us your indulgence.*

Make EVERY DAY "SCRAP SALVAGE DAY"

UNCLE SAM NEEDS ALL OF YOUR SCRAP NOW!

We cannot afford to let down for a moment on this grim job of winning the War—and that means—SCRAP METAL MUST CONTINUE TO POUR INTO THE STEEL MILLS! As our war production mounts, MORE and MORE SCRAP will be NEEDED. Take another look! Be on the ALERT! Start every bit of metal you can dig up on its way to battle.

DAVENPORT BESLER CORPORATION, Davenport, Iowa

Builders of Locomotives and Sno-Plows for the United Nations

Eliminates STOPS on Paper!

"The accurate cut-in and cut-off of your spray bar gives results we have been trying to obtain for years. With your machine we do not use paper at the end of a shot", Mr. W. E. Richardson, President of Interstate Construction Company reports . . . "No longer do we have to wash lines after each application, or worry about plugged nozzles." That's why the Standard Steel Works Model 400 is always first to leave Interstate's warehouse at the beginning of a job.

Think how much time and money this could save you and your crew. Write today for name of nearest dealer so that we can give you further details on this distributor.

INTER-STATE CONSTRUCTION COMPANY
OF NASHVILLE, TENNESSEE
ASPHALT ROAD CONSTRUCTION
THIRD NATIONAL BANK BUILDING
NASHVILLE, TENNESSEE

Osborne Equipment Company, November, 3, 1942
525 State St.,
Knoxville, Tenn.

Att: Mr. Tom Osborne.

Gentlemen; We acknowledge receipt of yours of October 19th, and thank you for your offer,to assist us on our work in Blount County.

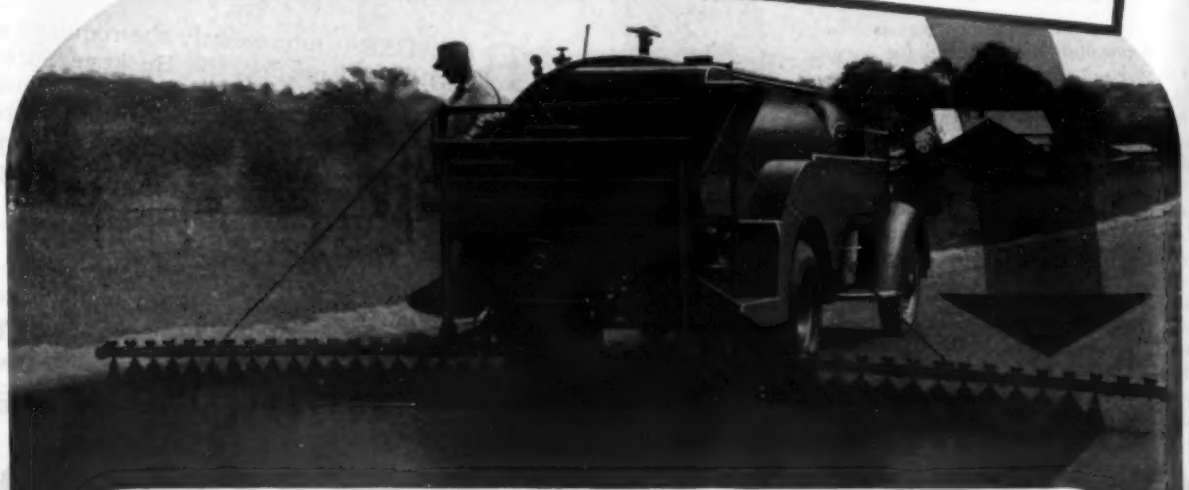
[illegible] believe that we have what equipment will be needed on this work, but no doubt we will be calling on you for assistance in one way or another. We are well supplied with bituminous distributors, and have a 1000 gal. Standard Steel machine with full circulating spray bars, which is giving excellent service. We have used it for two seasons, and it is always the first one to leave the warehouse at the beginning of the job.

Our Mr. H. A. Armstrong will be in charge of our Blount County work, with headquarters at Maryville. Mr. R.C.Payne from this office will visit the job from time to time.

Thanking you, and with kindest regards, we are

Very truly yours,
INTER-STATE CONSTRUCTION CO.,
of Nashville, Tenn.
By W. E. Richardson
PRESIDENT

HER/H



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"It Hit Me!" Common Explanation of Injury

Remember that Inanimate Objects Don't Come to Life and Strike You! When Accidents Occur, Track Down the Cause—and Blame Carelessness

By A. E. LEWIS

AN injury report of a construction worker reads as follows: "Putting 300 pounds of ice in the box—a crock fell off a shelf and banged me on the head."

Personal injury files of any large company will offer numerous similar statements, which if not quite as amusing, are fully as much to the the point. "The pliers flew into my eye"; "The wire caught my finger"; "The steel jumped out of the machine". These are actual descriptions by otherwise intelligent men of how their accidents occurred. They were merely going about their work, and so were their co-workers; then some nasty old machines or tools came to life and struck them!

It reminds one of childhood, when mother, in order to appease her injured youngster, would spank the table on which the child's leg had struck to admonish the wood for its carelessness. That may have been all right for childhood, but the appalling part of the story is that the belief in inanimate objects not only "doing" things but "intending" to do things lingers with us. Not as literally perhaps, but somewhere in the back of our minds we still find a way of blaming tools, machines, even solid earth, for our misfortunes.

If the quotations given above were merely a play on words, we could pass them with a smile. We know that the man did not really believe that the crock had any ulterior motive in slipping off the shelf and striking him. But in giving his explanation, the worker showed his belief in something more dangerous: the injury had been merely *an accident*. With this accusation against the crock, he dismissed the incident as *unavoidable*.

An examination of witnesses' statements showed certain mitigating evidence in favor of the crock. For one thing, it was set on too narrow a shelf. Also, in order to set the cake of ice in the refrigerator, an unnecessarily long pole was used as a pry. This pole appears to have "urged" the crock to jump.

This worker passed up the safety lesson which is inherent in any mishap. He hid it by blaming a crock. Others do it by blaming wrenches, crank handles, ladders, drills. Allowing that tools may go amiss, they are blamed a hundred fold more than their due, and almost invariably a faulty tool can be discovered before it starts "getting fresh".

Make Accurate Reports

A primary step in avoiding minor accidents is to make a correct report of those that do happen. Sometimes it may hurt. It may show carelessness. It may show general unsafe practices. It may even indicate negligence on the part of a foreman. But it will also help to correct unsafe practices!

A war-geared plant or job that insists on reports of all minor injuries is only kidding itself if its files are loaded with yarns of flying pliers, splashing concrete, wires with an affinity for fingers, steel jumping out of a machine when it gets the notion, and similar malicious equipment. If it is important to know what hit a man, it surely is important to know *why* it did so.

Ask your employee to tell you "why" it hit him. Insist that he trace his "accident" down to its human roots. Only then will he understand the true cause of injuries and be able to cooperate in making them infrequent.

In order to cooperate in the conservation of paper, CONTRACTORS AND ENGINEERS MONTHLY *is now being printed on a somewhat lighter-weight paper, and in a new trim size which does not change the size of the type page but does make possible a paper saving by reducing the size of the sheets required for the presses.*

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Why Let a Motor Knock Itself to Pieces Because of Carbon!! Or Why Take It All Apart Just to Remove Carbon!!!

LET CARBO-FLO CARBON REMOVER CLEAN OUT ALL THE CARBON IN 5 MINUTES!!

CARBO-FLO CARBON REMOVER is a powder that burns the carbon off the valves, pistons and spark plugs. Simple to use—just remove the air cleaner and shake powder from convenient can into carburetor while motor is running.

THE ACTION IS IMMEDIATE. THE EFFICIENCY OF CARBO-FLO CARBON REMOVER WILL AMAZE YOU!!!

One can contains sufficient for any car, truck, or tractor motor. The price is $2.00 per can. Packed 6 or 12 to the carton.

CARBO-FLO CARBON REMOVER WILL SAVE MANY TIMES ITS COST IN GASOLINE, OIL—AND MOTOR EFFICIENCY.

CARBO-FLO MANUFACTURING COMPANY, 549 West Randolph St., Chicago

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W. R. MEADOWS, INC.

ELGIN ILLINOIS

Paving Access Road To Air Base in Utah

(*Continued from page* 9)

order to channelize traffic, a 600-foot neutral zone was created, with a maximum width of 20 feet near the gates of the base and narrowing to zero at the far end. There are two of these zones, one running east from the gate and the other running south. This neutral zone has a concrete curb 20 inches wide and 6 inches deep at the surface of the roadway, rising from a gutter width of 6 inches to 10 inches thick at the back. The rise is in a distance of 8 inches, giving a 6-inch top to the curb at the neutral zone. This curb was cast in place, using transit-mixed concrete. The surface of the neutral zone, 4 inches above the surface of the roadway, was covered with 1 inch of oil mat.

Along fills, to protect the slopes from erosion, the contractor was required to leave a curb of the oil mat to carry the water to the nearest paved run-off ditches. Also as protection to the sides of the fills, some sections were paved, and the same method of protecting cut ditches was also used.

Major Quantities

The major quantities involved in this contract, which was awarded to Reynolds-Ely Construction Co., of Springville, Utah, for $45,750.00, were:

Natural rock asphalt	2,550	tons
Bituminous material for mix, SC-3	61,000	gallons
Bituminous material for tack coat, RC-4	5,550	gallons
Scarifying and mixing, 44 feet wide	0.193	miles
Scarifying and mixing, 24 feet wide	3.241	miles
Scarifying and mixing for paved embankments and cut ditches	1.458	miles
Concrete curb and gutter	1,200	feet
Structural excavation	50	cubic yards

Personnel

This contract was operated by the contractor under the personal supervision of H. T. Reynolds as Superintendent. L. Wendelboe was Resident Engineer for the Utah State Road Commission.

A New Stronger Tire For Large Scrapers

A new rubber tire developed for the three-fold purpose of increasing tire life, conserving rubber, and speeding up earth-moving and excavating operations, has been announced by The Firestone Tire & Rubber Co., Akron, Ohio. This Firestone rayon multi-ply tire is reported to provide 98 per cent more resistance to body breaks than tires heretofore available for this field of operation. Notwithstanding this increased strength, the tire maintains a full degree of flexibility, a characteristic which is necessary to efficient operation.

From a conservation standpoint the new Firestone tire is noteworthy. Because of the resistance of this new construction to body failures, the full potential of tread life is utilized. Tires of the old type, because of body weakness and consequent early failure, were frequently consigned to salvage even though the tread was in good condition. In addition to conserving rubber by reducing the premature discard of tires, the new construction also means fewer costly delays because of equipment laid up awaiting tire repairs.

Users of this type of equipment can secure complete information and required priority data direct from Firestone by referring to this item.

India Modernizes Roads

The highways of India are carrying tremendous traffic loads because of the requirements of mechanized forces, according to a recent report in *Foreign Commerce Weekly*. In the fiscal year 1941-42 work was started on the Grand Trunk Road. Concrete was laid for 52 miles and a further 54-mile extension will be completed in 1943. An engineering plan for road systems for the whole of India is under consideration.

Roads of strategic importance and trunk roads will be modernized and construction speeded up during 1943.

FIGHTIN' PUNCH

American flying fortresses are effectively armored beyond comparison with other combat planes.

So too, Owen Buckets embody extra strength and re-enforcement at all points subject to particularly hard wear or excessive strains.

The OWEN BUCKET Co. 6936 Brookwater Ave. Cleveland, Ohio

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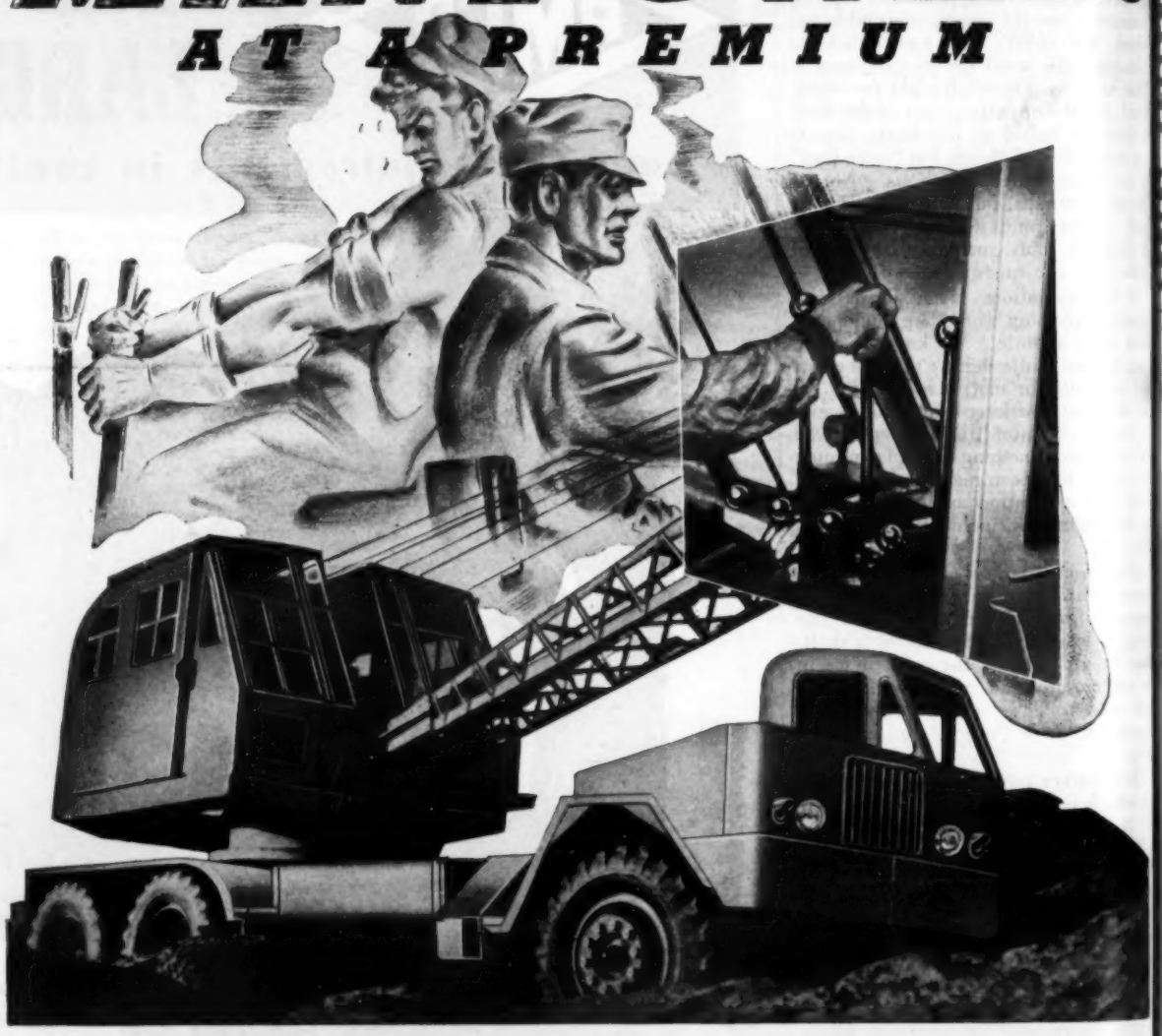
A MOUTHFUL AT EVERY BITE

MANPOWER AT A PREMIUM



THAT vital need of the hour—*Manpower!*

As precious as time itself—and as irreplaceable; For years Michigan Cranes and Shovels have featured Manpower Conservation through the use of easy, fingertip *Air Controls*, quick-change attachments, simple, trouble-free mechanisms and "truck mobility" with minimum time "between jobs"—more productive time on the job. And now in the vast construction-for-Victory program, these Michigan advantages are potent factors in helping to solve America's pressing problem of MANPOWER.

Full facts on "Michigans" will be mailed promptly. Request Michigan Shovel-Crane Bulletin E-112.

AIR CONTROLLED

MICHIGAN POWER SHOVEL CO.

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THOMPSON CONSTRUCTION MATERIALS & EQUIPMENT

CONCRETE CURING MATERIALS
- Hunt Process
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Cleaning a highway drainage ditch with a new Hystevator near Vale, Ore.

Easier Maintenance For Highway Ditches

The cleaning of drainage ditches along highways is a slow operation when done by hand. When ditches fill up from slides, drainage systems cannot function and damage results, frequently attaining the proportion of washouts. Willamette Hyster Co., Portland, Ore., has just developed a new device which will be a boon to state and county highway departments where the manpower shortage is already being felt seriously in the maintenance departments.

The Willamette Hystevator is a compact small scraper unit mounted on any standard make of truck which enables two men to do approximately three times the work ordinarily done by hand by three men, giving a net man-hour saving of over 450 per cent.

The standard maintenance crew consists of a truck driver with two men, capable of an average output of 7 to 8 truck loads per day with all three men shoveling. When the Hystevator is used, the average output of the same crew is from 20 to 30 loads per day. One man operates the bucket in the ditch, the driver remains in the truck, and the third man trims the ditch by hand for improved appearance. The latter is often dispensed with as the hand trimming is not essential.

The manufacturer reports that this new unit leaves the ditch with proper contour, digs as it loads, does not require a separate power plant or a power take-off, does not interfere with dumping, does not cut down truck capacity, is quickly installed or removed, does not impede traffic, does not straddle the ditch so that it can work against cut banks, and the truck remains on the highway shoulder out of danger of being struck by passing traffic.

Complete details regarding the Willamette Hystevator may be secured direct from the manufacturer by mentioning this descriptive text.

Heavy Spring Rains Affect Bridge Job

The heavy spring rains of March and April, 1942, did much to alter the methods of construction of a 240-foot 6-span bridge carrying the new military loop highway around San Antonio, Texas, over the Missouri-Pacific Railroad. General well pumping has lowered the ground water in this section to about 20 feet below ground surface, and during dry spells it is even lower, so that the footing excavation for most bridge and other similar work is done in the dry. On this structure, however, the rains caused a heavy absorption of water in the top layers of the ground. When excavation was started for the footings, the water flowed into the holes, requiring almost constant pumping. Clay and gravel were removed from the footing excavation by a General Excavator crane equipped with a ¾-yard Owen clamshell bucket.

In digging for the open abutment in the side of the railroad cut, a Gorman-Rupp self-priming pump was used to keep down the water so that the laborers with clay spades operated by a Sullivan portable compressor could work in the clay-gravel conglomerate. The railroad grade was lowered approximately 10 feet at the point of this crossing. The ground water weakened the railroad subgrade so that it was necessary to drive piling throughout the railroad cut at the end of the ties to stabilize the railroad roadbed.

Ben Gresham was Superintendent for Holland Page, contractor of this Project DAWR 3B1, Contract 2, and B. C. Jenkins was Resident Engineer for the Texas Highway Department.

Du Pont Receives Award For Service To Safety

A special award of honor "for distinguished service to safety" was presented early in January to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., by the National Safety Council. The award was announced by Colonel John Stilwell, president of the Council, and head of a nation-wide campaign now being conducted to "save manpower for warpower."

In presenting the award, Colonel Stilwell said that the du Pont Co. had "one of the finest safety records ever made by an industrial organization in the history of the United States". Figures show that thirty-eight of the du Pont plants have had no reportable accident in at least 18 months and further that one of those plants previously had established a world's record of more than 11,000,000 man-hours without a reportable accident.

EVERY ENGINEER...
EVERY CONTRACTOR...

Should have a copy of this bulletin describing

THE INDUSTRY'S FILM-CURING COMPOUND FOR CONCRETE

The Compound with 60% Solids

EVERY test shows that it's the solids in the film that count most in providing a satisfactory film-cure for freshly laid concrete.

And every fact points to film-curing as the most efficient and most economical way to cure concrete.

RITECURE

A Transparent Membrane for Curing Concrete is sold by:

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204 West St., New York, N.Y.

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3-JM-6

THE *Boost* THAT PUTS THOUSANDS OF H. P. INTO ACTION . . .

At many bases, under various conditions, the starting of airplane motors often presents real problems. To step up, speed up and conserve starting equipment, "boosters" are used, powered by dependable Briggs & Stratton gasoline motors. This is but one of many "out-of-the-ordinary" applications which, with scores of more familiar uses, make up a most impressive list of ways the armed forces are being served by Briggs & Stratton motors.

As an emergency wartime service, we are trying to route "used" Briggs & Stratton motors that may not now be in service, into the hands of those who need them so badly.

Do you know of any Briggs & Stratton 4-cycle, air-cooled gasoline motors — no matter how old — that are not in active service? If so, please write us, giving sizes, model numbers, and a report as to general condition. We will serve as a "clearing house" to make contacts between owners and prospective purchasers.

BRIGGS & STRATTON CORP.
MILWAUKEE, WISCONSIN, U. S. A.

Beat the Axis
Invest in
U. S. War Bonds

4 CYCLE
BRIGGS & STRATTON
GASOLINE MOTORS

Courtesy, Douglas Aircraft Co., Inc.

An Assembled Plant For Making Cold-Mix

Troubles in Producing a Suitable Mix Using the Materials on Hand in Damp Weather in Northern Ontario

✦ IN chilly weather last October contractors were laying cold-mix for road surfaces and a parade ground at an airport in northern Ontario. The only materials available were a sufficient quantity of RC-2 and an adequate stockpile of semi-crushed 1-inch gravel. The temperature of the stockpile, taken with an armored thermometer, was found to be only 41 degrees F. at midday. This led Herbert P. Pearson, technical director of Kotal Co., who was visiting the job to try to speed up the work, and who reported this to us, to advise the immediate acquisition of a steam boiler to be set up close to the mixer.

Crude Field Methods

The boiler and mixer were finally located and with the aid of a bulldozer a ramp was made to support the mixer at sufficient elevation to permit delivery of the cold-mix into trucks. The mixer was just an old-fashioned one-hole affair. In order to heat the aggregate, a ¾-inch steam pipe ending in a rubber hose was rigged up with the hose run into the mixer. With steam at 80 pounds pressure, it was found that 1,100 pounds of gravel in the mixer at a temperature of 42 degrees F. could be raised by one-minute steaming to 60 degrees.

The RC-2 was kept in a nearby tank wagon at 180 degrees F. by means of steam applied to the coil. The exhaust steam from the coil was used to emulsify Kotal, which was placed at the bottom of a pail and the exhaust steam kept running into it. By the time the mix was ready for the Kotal, the pail contained nearly a gallon of emulsified Kotal.

The 4-minute mixing cycle consisted of: (1) charging the gravel; (2) steaming; (3) mixing the lime with the gravel after turning off the steam; (4) mixing the Kotal emulsion with the gravel and lime; (5) mixing in the RC-2. Every batch was found to be completely coated and great economy was effected in the use of the RC-2.

Spreading the Mix

The batches of mix were trucked out onto the road, dumped in piles, and then spread 2½ inches thick by a grader and compacted by a tandem roller. The engineers on the job were well pleased with the cohesiveness and toughness of the mix.

During part of the laying there was a steady drizzle of rain and many puddles were actually covered by the mix. The roller squeezed this water out at the sides of the section laid and none of it was incorporated in the compacted mix. This property of extrusion of excess moisture, which has been demonstrated in Kotal soil stabilization, was also noticed by the engineers responsible for the job when the truck man stood in the mix in the truck to spread it. As he lifted his foot a small puddle of clear water was observed.

One of the economies of this job, which produced an all-black mix with a gravel just above freezing and steamed for about one minute, was that the cost of the Kotal and lime for the batches, somewhat less than 50 cents per ton, was more than offset by dispensing with a drier, the reduction in the quantity of asphalt required, and the ability to continue operations during wet weather.

Texas Roadside Planning Suspended for Duration

The Texas Highway Department has suspended the work of the Division of Roadside Development for the duration. Jac L. Gubbels, formerly Head, Roadside Development, has been made Director of the new division of Urban Planning, effective January 1, 1943.

The official order creating this new division reads, "Since it is apparent that all of the authorities of today feel that our post-war development programs are going to involve material improvements in and adjacent to urban areas, it is considered most desirable for the Department to crystallize its ideas on definite urban plans in and around many of our cities insofar as designated highways are concerned."

AMERICAN DeLuxe Concrete WHEELBARROWS
With Steel Wheel
for WAR ORDERS

Write for Bulletin

American No. 1—4 cu. ft. struck capacity DeLuxe Concrete Wheelbarrow with steel wheel.

Code with steel wheel.....PERFECT-S

THE AMERICAN STEEL SCRAPER CO., SIDNEY, OHIO

Simple, SYSTEMATIC DRIFTER LUBRICATION CUTS REPAIRS, BOOSTS FOOTAGE

Regular lubrication is a vital factor in the performance and service given by any drifter drill. It is particularly important today when the war effort and the scarcity of strategic materials demand the conservation of every piece of drilling equipment.

Here are four simple lubrication suggestions which will help you get the most out of your CP Drifters. While these suggestions apply particularly to CP MOTORdrifters they are applicable generally to other models. Detailed recommendations on hand-cranked CP Drifters will appear in future advertisements.

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AIR COMPRESSORS
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AVIATION ACCESSORIES

The new Link-Belt car spotter.

Electric Spotters Now Made Portable

The Link-Belt line of motorized electric car spotters, heretofore furnished only for stationary mounting, is now available also in portable form, according to a recent announcement of Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill. The spotter is well-balanced on a channel-iron frame so that one man can lift one end and roll the units to any desired location. The operator need but anchor the frame with a chain, plug the electric cord into the nearest power outlet, hook one end of the haulage cable to the car to be moved and wrap the other around the capstan. Then the motor is turned on and the cable is fed while the machine does the actual pulling. This change in mounting gives the standard machine added versatility for spotting railroad cars on any number of tracks, hauling trucks, and doing other moving jobs at separate locations.

A new Link-Belt leaflet, No. 1954, contains the overall dimensions of the new portable machine. Copies of this will be sent promptly by the manufacturer to those mentioning this item.

There is no better investment in the world than a share in freedom and world peace. Buy U. S. War Bonds!

Mechanical Engineers Needed by Navy Dept.

The Navy needs mechanical engineers who can qualify as operating, maintenance and inspection officers. Candidates may be up to 50 years of age, and should hold a degree in Mechanical Engineering or be able to offer 10 to 15 years of experience in mechanical engineering, with evidence of having had responsible charge of work, in lieu of a degree. They must meet Naval physical requirements and possess officer-like qualities.

The duties, which may be ashore or afloat, involve diesel, electrical or steam engineering; assembly, maintenance and repair of aircraft engines and also of machinery and electrical or mechanical equipment; supervision and follow up of production and production equipment.

Application should be made to your nearest Office of Naval Officer Procurement, or to the office at 33 Pine St., New York City.

Electric Generators For Contractor Use

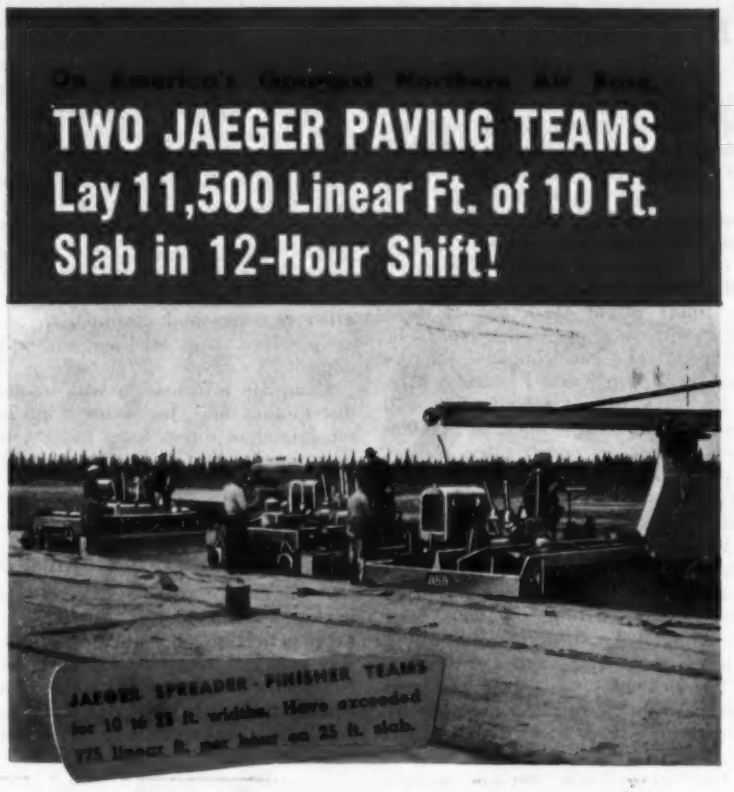
A complete line of portable gas-electric generators furnishing 110-volt alternating or direct current in capacities from 350 to 5,000 watts is described in detail in the latest red-banded folder of Wind Power Mfg. Co., Newton, Iowa. These plants are made with manual, remote or automatic control, depending on the sizes, are all readily moved but special portable models are available especially designed for construction jobs. These include dolly and trailer-mounted units making them most easily moved for repair operations and the operation of electric drills, saws, hammers, grinders, riveters, finishers and air compressors.

Copies of the Winpower gas-electric light and power plant folder may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Mowing By Machine Versus Hand Mowing

On comparable areas, the relative costs of hand and machine mowing are $5 and $1 respectively. In these days, when one considers the vastly greater area that can be mowed in a day by machines, and the rapidly dwindling labor supply, the relative costs and ability to get the mowing done throw an even greater balance in favor of machine mowing. In the past the selection of the method used has rested largely on state and local politics and policies. In New York State the annual cost for hand mowing ran in the neighborhood of $700,000, a sum that is difficult to justify under wartime conditions as to personnel and finances.

Take care of your equipment and keep it working for Victory.


On America's Greatest Northern Air Base
TWO JAEGER PAVING TEAMS
Lay 11,500 Linear Ft. of 10 Ft.
Slab in 12-Hour Shift!
JAEGER SPREADER-FINISHER TEAMS
for 10 to 25 ft. widths, Have exceeded
775 linear ft. per hour on 25 ft. slab.

To build the latest stepping-stone to Europe, in a remote land without roads, McNamara Construction Co., Ltd., chose Jaeger Concrete Screw Spreaders and Jaeger Type "H" Finishers to team with two 34E pavers—worked 24 hours a day to complete 623,000 sq. yds. of 6" concrete runway in 10x100 ft. slabs—reached production rate as high as 13,000 sq. yds. (11,500 linear ft.) per 12-hour shift. Runways, which measure 200x6000 ft., already equal 53 miles of 20 ft. roadway—will constitute one of world's largest fields when extensions are completed.

All equipment, including complete machine shop and gravel plant, workmen, materials and supplies (except local aggregate) had to be brought in by ship thru submarine-endangered waters open to navigation less than half of the year—a testimonial to the difficulties of the operation, the efficiency of its organization and the dependability of the equipment selected.

JAEGER SPEEDLINE TRAILER MIXERS up to 14S size have machined steel drum tracks, automotive-type transmission.

FOR HELP ON YOUR OWN PAVING, MIXING AND PUMPING PROBLEMS, CONSULT YOUR JAEGER DISTRIBUTOR: He offers proved machines and methods, knowledge of job layout and local conditions, complete repair parts and service to keep your equipment in top shape.

JAEGER "SURE-PRIME"—THE PUMPS THAT EXCEED THEIR PROMISES: Only pumps that, for years, have been individually tested and certified for vacuum, capacity and pressure and regularly exceed this guaranteed performance—with up to 5 times faster priming, high air and water capacity under adverse conditions and thousands of extra hours of service. High pressure shell construction, replaceable liners, longest life seal, hi-head, hi-capacity impellers, oversize shafts—3000 to over 200,000 gallons capacity.

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BITUVIA ROADS

are Easy on Tires . . .

The highly resilient, skid-resistant surface of BITUVIA roads is easy on tires—helps save vital rubber. BITUVIA's deep penetration and firm binding properties make for construction and maintenance economies, and the speed with which it can be applied makes BITUVIA the logical material for emergency road construction and repair jobs where time is a vital consideration. Standard grades to meet any Federal, State, County or Municipal specifications.

BITUVIA Road Tar

REILLY PLASTUVIA is a plasticised coal tar filler which binds firmly to concrete, brick or stone surfaces, effectually filling and sealing cracks and openings between surfaces to prevent water damage. PLASTUVIA will not flow or "pull" in summer nor chip in winter.

Complete information on these products will be sent on request.

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SEVENTEEN • PLANTS • TO • SERVE • YOU

A Westinghouse contact light of truss-type construction designed to withstand a 100,000-pound dead-weight load.

A New Contact Light Of Unusual Strength

Airport-runway marker lights, called contact lights, indicate to the pilot the point of contact with the ground. They were first introduced about seven years ago and were seldom damaged by a plane when landing. Designed to withstand a 35,000-pound dead-weight load, the old lights were sufficiently strong for that time. Today's big bombers and strato-liners would crash one of these earlier units, so a new design had to be developed. The new contact light, designed by Westinghouse Electric & Mfg. Co., Lighting Div., Cleveland, Ohio, will withstand dead-weight loads of 100,000 pounds. The new construction utilizes the principles of bridge design, with truss sections and no cantilever members.

All strategic materials have been avoided in the construction of these lights, saving three pounds of nickel and a quantity of aluminum previously used in the reflector. Rubber gaskets have been eliminated; shock-resisting glass and pre-focused lamps have been added. The two-element lens system has been replaced with a single lens, thereby obtaining an 8 per cent increase in light efficiency. All manufacturers of this new light use the same standard mounting dimensions. Thus sub-assemblies made by any company will fit all other units. This feature makes the new contact light advantageous for use on both military and commercial airports here and abroad.

For more complete information write direct to Westinghouse and refer to this descriptive text.

New Lubricating Oil For Jeep and Truck

A new brand of lubricating oils, made to meet U. S. Army specifications for internal combustion engines for ground equipment such as trucks, tanks and jeeps, has been announced by Gulf Oil Corp., Pittsburgh, Pa. These Gulf Dieselube H. D. (heavy-duty) oils have also been approved by the leading manufacturers of diesel engines for tractors and trucks. They are also recommended for gasoline engines in commercial equipment where service is extremely heavy, to overcome ring sticking, lacquer formation, and bearing corrosion.

Severe heavy-duty diesel-engine tests conducted by Gulf Research & Development Co., the research subsidiary of Gulf Oil Corp., which developed these oils in cooperation with the Lubricating Department, have proved them to be detergent-type oils, non-corrosive to alloy bearings and eliminating, as far as possible, ring sticking and engine deposits.

Complete information with names of distributors may be secured by interested readers direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Good Neighbor Policy Benefits Mexican Road

A number of years ago we published in CONTRACTORS AND ENGINEERS MONTHLY an article on the Pan American Highway entitled "Good Roads Make Good Neighbors". Apparently the reverse is equally true, that good neighbors make good roads, or can do so by an exchange of good ideas.

According to a report in the January issue of *Texas Parade*, a good neighbor policy under which the Texas Highway Department exchanged technical information with Mexico is enabling that nation to save $140,000 in the construction of a road from Ciudad Victoria to Matamoras, across the Rio Grande from Brownsville. The road will be partially paved in 1943. Governor Magdalena Aguilar was quoted in Associated Press dispatches as being "very grateful to the Governor of Texas and the Texas Highway Department laboratories for their frank and concrete aid."

The Highway Department made available to the Mexican engineers its methods of mixing native soil with cement to form a soil-cement base for a light asphalt surface, a type of construction in which the Texas Highway Department has pioneered. Mexican engineers visited the Highway Department's laboratories to study technical and control details of the method.

You can depend upon the greedy jaws of Industrial Brownhoist clamshell buckets to speed up your material handling. Their deep clean bites practically eliminate hand shoveling. Fast opening and closing action. Extra sturdy. Minimum rope wear and maintenance. Standard types (rope-reeve, power-wheel, link-type) in stock for immediate delivery. Write for information.

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GET THE JUMP ON BUSINESS

Fast efficient operation is the keynote of today's means of doing business. To get the jump and keep the ball rolling requires not only good judgment but the tools to do the job right. And, when you put a SCHRAMM in the game you will get the outstanding performance that is needed to score on every job. Select the model best adapted for your needs . . . a 20, 60, 85, 105, 210, 315 or 420 cu. ft. capacity.

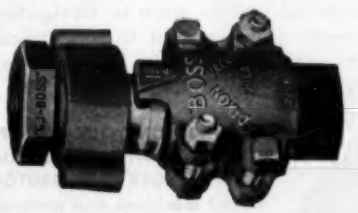
SCHRAMM INC.
AIR COMPRESSORS
WEST CHESTER, PA.

LIGHT WEIGHT
SELF STARTING
GASOLINE OR DIESEL POWER
COMPACT DIMENSIONS
ECONOMICAL ENGINE SPEED
AUTOMATIC CONTROLS
LONG LIFE
FORCE FEED LUBRICATION
COMPRESSOR EFFICIENCY

SCHRAMM INC. ★ THE COMPRESSOR PEOPLE

The *Safe* Way to End *Any* Hose Line!

"GJ-BOSS"
GROUND JOINT
FEMALE
HOSE COUPLING
STYLE X-34



For Steam, Hydraulic, Air Hose

Designed to assure maximum strength, durability and safety under all conditions. *Washerless* construction consists of soft-to-hard metal seal that will not leak, regardless of wear or the presence of abrasive particles.

"BOSS" Offset Interlocking Clamp anchors coupling to hose with a powerful grip that is proof against straight line leaks and blow-offs. Sizes: ½" to 4", inclusive.

"GJ-BOSS"
GROUND JOINT
AIR HOSE COUPLING

Same washerless, leakproof construction as style X-34 coupling, described above, and furnished with equally efficient "BOSS" Interlocking Clamp. No washers to replace . . . no loss of working pressure through leaky connections . . . no danger of blowoffs. COMPACT TYPE, Style XLS-81, ¼" and ⅜". HEAVY TYPE, Style XHB-72, ¾" and 1".

Sold by Manufacturers and Jobbers of Mechanical Rubber Goods

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Avoid Legal Pitfalls

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Edited by A. L. H. STREET, Attorney-at-Law.

A Contractor Acts on Uncle Sam's Behalf

Contractors who installed facilities for the Government at Camp Crowder were sued by owners and lessees of land on which the camp was built. The suit rested on the ground that the contractors wrongfully entered upon the land—apparently on a theory that the Government had not acquired the right to use the plaintiff's land by condemnation or otherwise.

The question bobbed up as to whether or not the United States District Court for the Western District of Missouri had jurisdiction of the case. That question in turn depended on whether the suit involved points of *federal* law, as distinguished from *state* law, which ordinarily would apply where a private construction corporation has trespassed upon privately owned land.

Deciding that the Federal District Court had jurisdiction of the case, its judge, Judge Reeves, said:

"Although the defendants were engaged by the Government to construct facilities for its military purposes, yet, in entering upon the land and in engaging in the work contracted to be done by them, they were necessarily working for and on behalf of the Government. It was the Government, in the exercise of its authority, that caused them to go upon the lands in question and begin their work. Since the Government was engaged in pursuing a great national purpose in the midst of a great national emergency, *neither the state law nor any individual could interfere with or thwart that purpose.* * * *

"The Government not only has the power to contract with individuals and corporations to provide facilities for governmental and especially military functions, but it follows, as the day the night, that it has the power to protect the operations thus validly authorized."

Recognize Status of Supplemental Contracts

A Wisconsin statute requires that state highway improvement contracts be approved by the governor and the chief engineer of the highway department. This statute does not apply to an agreement which merely supplements a contract that has been so approved, particularly where the original contract provides for supplemental agreements. So decided the Wisconsin Supreme Court in the case of State v. Smith, 299 N. W. 43. The court said:

"The supplemental contract is simply a modification of the original contract or, more specifically, an adjustment of compensation to the contractor for particular items of work. It is not a contract to do work for the state but one in respect of the compensation for work which the contractor is already obligated to do for the state. * * * Aside from this, * * * if the supplemental agreement must stand on its own footing as an independent contract for construction work, then it must be let by competitive bids. This, however, could not be done since a contractor was already engaged upon the project and not only obligated but entitled to do the work. * * *

"We think there can be no serious question as to the power of the state highway commission to provide for such supplemental agreements. * * * It does not, as is intimated by defendant, create the opportunity for raising to exorbitant levels the cost of work done under these contracts, nor does it destroy the effectiveness of the competitive bidding system. It is a necessary provision in the economy of road construction."

Legal Loop-Holes

When a squabble over rights or liabilities under a contract approaches the lawsuit stage, some lawyer is apt to be called in to use his fine-tooth comb and microscope on the document, in an effort to find a legal hole in it large enough to permit his client to do a "Houdini". So more than scant attention should be given to the formation of contracts, with a view not only to making them holeproof, but to avoid leaving any pretext for a lawsuit.

In the case of Federal Underwriters' Exchange v. Skinner, 146 S. W. 2d, 325, a highway contractor hired a pile driver from its owner. Skinner, who had been employed by the owner of the pile driver, had worked for the contractor only two hours when injured. The contractor's liability insurance company claimed that it was not liable for the payment of workmen's compensation, because the contract for hiring the pile driver was not *signed* until the day after the accident. The courts said that the insurance company was liable.

The insurance company admitted that the pile driver had been hired under an *oral* contract which made the contractor the injured man's employer, but claimed that the written contract superseded the oral contract. The company's claim, that it was not liable under the written contract because it was signed after the accident, and was not liable under the oral contract because it had been superseded by the written one, is reminiscent of the old story about the saloon patron who swapped a drink of whiskey for a drink of brandy at the bar and declined to pay for the whiskey because he had not drunk it and refused to pay for the brandy because he had traded the whiskey for it.

Extent of Obligation To Avoid Accidents

That a contractor is not bound to foresee and guard against every possible accident to others in the course of his operations is well illustrated by the decision rendered by the Louisiana Court of Appeal in New Orleans. (O'Neill v. Hemenway, 3 So. 2d, 210.)

After completing a job, the defendant contractor temporarily placed a pile driver on nearby ground which had been dedicated as a street but not yet opened to public travel. A browsing youth who seated himself under the pile driver was killed by lightning and his parents sued for damages. The court ruled that the suit against the contractor was properly dismissed.

To a contention that the contractor should have "grounded" the pile driver against lightning, the Court of Appeals replied: "Defendants were under no obligation to guard against every possibility of harm, but only *such harmful contingencies as might be reasonably expected.* It has been shown that lightning very rarely strikes pile drivers. Consequently, defendants were not obliged to ground the driver. Moreover, it is not certain that the lightning struck the driver, since it sustained no damage of any sort."

To a further contention that the pile driver was an unlawful obstruction of a public street, the court replied that, not having been opened, it was not a public street; and that, even if it had been, the obstruction of the street could not be regarded as the cause of the accident in such sense as to make the contractors liable in damages.

Tunnel as a "Structure"

When a lien law says that a material man shall enjoy a lien against a "structure" on account of materials furnished a subcontractor for its construction, a railway tunnel falls within that category. So ruled the West Virginia Supreme Court of Appeals in the case of Atlas Powder Co. v. Nelson and Chase & Gilbert Co., 20 S. E. 2d, 890.

But it seems that just what may be deemed to be understood by the term "structure" depends largely upon the context of the particular statute. In some instances drainage systems have been held to be included in the term, while the courts of other jurisdictions have reached contrary conclusions.

HEET-MASTER—SAVES 50% ON FUEL
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Dallas

WET or DRY, the 4 speed "3-in-1 Rotary Action" gives a BETTER, MORE UNIFORM PULVERIZED MIX

These are days of fast construction schedules and labor shortages. Roadway contractors and airport construction engineers want road-building machines that give superior performance. In the early days of soil-cement construction, back in '37, the FIRST soil-cement areas and roads constructed were made with ROTOTILLER. One of the first airport runways constructed with this revolutionary "3-in-1 rotary action" machine was praised by pilots as "the smoothest runway we ever came in on". It is noteworthy that these and similar pioneer soil-cement jobs were built with early ROTOTILLER models; 1943 models are even better and incorporate practical improvements suggested by contractors themselves.

Today, more and more soil-cement and stabilzation work on highways, landing strips, airport runways, and landing fields is being done. ROTOTILLER Roadmaker with its patented, perfected "3-in-1 rotary action" assures more accurate control in wet and dry mixing, as well as more thorough pulverization of materials. The scientific, spring-tine rotary action thoroughly mills the earth from top to bottom, resulting in complete pulverization and mixture to any depth up to 10 inches. You get all this in ONE operation—a better job at lower unit cost and with substantial savings in time and labor. Weighs, ready for work, only 3020 pounds—rugged, dependable.

See ROTOTILLER Roadmaker in action and you'll see why road and airport contractors consistently prefer this superior roadbuilder.

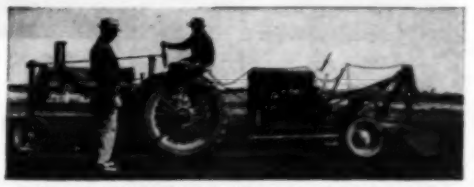
AND, AFTER THE WAR . . . *Post war reconstruction plans undoubtedly will include the building of thousands of miles of soil-cement and oil stabilized secondary roads. This work will be fostered as a means of giving employment to returning soldiers. Then, as now, ROTOTILLER Roadmakers will be on the job.*

Send for Illustrated folder and Technical data.

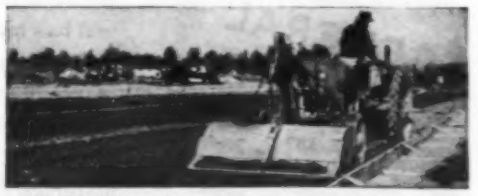
ROTOTILLER, inc. TROY, New York Dept. N

ORIGINATORS OF "3-in-1 ROTARY ACTION" TINES

Only ROTOTILLER gives you this 4 speed "3-in-1" mixing and scarifying combination.



Early model ROTOTILLER building one of the first military airports to use soil-cement. After two hard winters, runways are reported still in first class condition.



With ROTOTILLER Roadmaker mixing can be done close to forms as shown in this illustration. ROTOTILLER can be used with almost any type tractor.

On the job ROTOTILLER saves time, speeds construction by making sharp turns without taking tines from the ground or stopping machine.

C. & E. M. Photo

Typical of the wooden historical markers used along Arizona highways is this one designating Superstition Mountain.

Plan for Tourists Who Will Come Back

We are hearing much of the public works pool for post-war construction, and plans for that period must be prepared during these days of active war training and fighting. Along with its preoccupation with substitutes and revised designs for structures and new methods of maintenance to carry on its essential work during the war, Arizona is also planning for the return of that beneficent creature, the automobile tourist, to its midst in the days when rubber again rolls freely.

In order that the roads through its interesting desert lands and over its mountains may offer even more of the lure that delights the motoring public, a well-conceived program of marking points of historical interest in a manner to invite the attention of the traveler, take him off the road, and give him the information in an attractive form, has been devised. Some forty large wood signs of the number planned have already been completed and over half of these set out at suitable points where vehicles can turn off the road to read the information in carved letters on the face of the sign. An advance marker is placed uniformly one mile on either side of the historical marker so that the tourist may slow down and read. These signs are further set off by cactus plantings so that the signs may not be mistaken for advertising for a new cola or café.

The lumber was furnished by the Traffic Division of the Arizona Highway Department, the carving and coloring were done by the NYA, and the Landscape Division selected the sites and did the planting to complete the picture.

Highway Finances Today and Tomorrow

Approximately 30 per cent of our national highway income—gas taxes, license fees, weight taxes—for many years has been paid out for debt service. With the rapidly dwindling income from these sources, the per cent of total income required for debt service will increase sharply. The money currently paid out on indebtedness incurred in the past cannot be reduced except as bonds come due and are paid off so their interest charges cease. To repudiate outstanding highway bonds would be disastrous to future highway financing, when the need of highway reconstruction will be great, and the employment which the program would create might be endangered at a time when it is most needed.

Diversion of highway funds to non-highway uses has been definitely stopped by constitutional amendment in fourteen states where taxpayers have taken a hand to insure proper use of highway taxes. Diversion of highway funds in the country as a whole amounts to 15 per cent of the total highway taxes collected. This figure must be reduced by active campaigns to pass more state constitutional amendments, or highway funds will be raided further by politicians and be lost forever to the construction and maintenance of the country's greatest transportation system—our highways.

There is a growing feeling that the per cent of highway funds now going to county highways would bear revision downward, although the necessity for expenditure of larger parts of such revenue on the major city arteries is anticipated. This would necessitate concerted drives in the individual states to get the money back under the jurisdiction of the state highway departments so that future highway programs may be more properly co-ordinated. After this war there is no doubt that cities will be great claimants on state highway funds and that there will be increasing demands for them by the counties. It is not the feeling that less money should be expended within cities and on county roads but that the control should be under state highway departments to insure properly co-ordinated construction.

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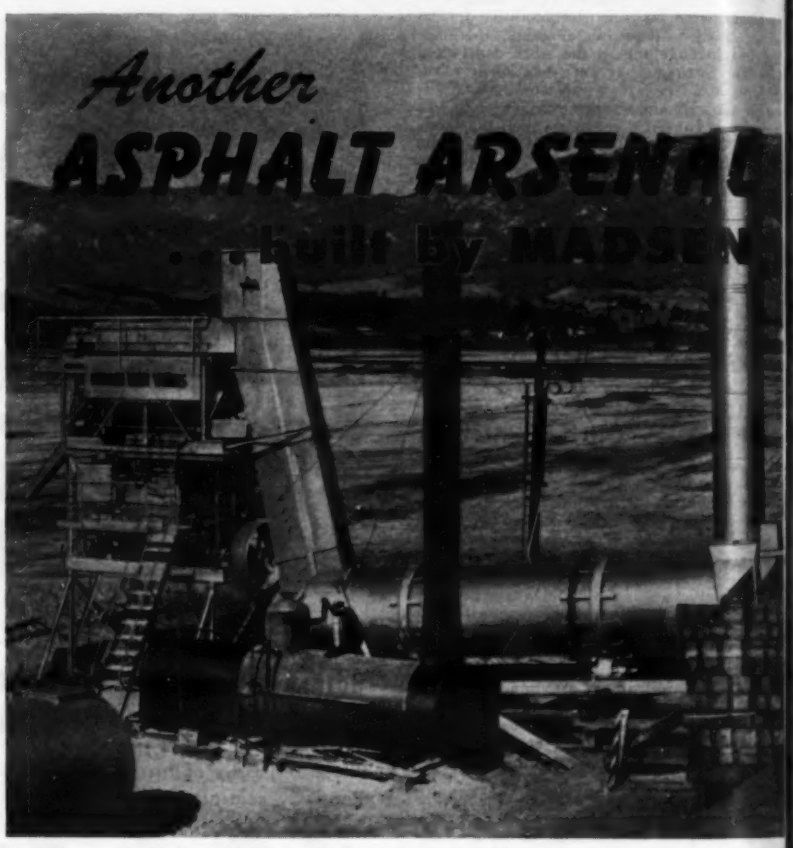

THERE IS MORE to war than munitions—highways, airports and training centers are as necessary as food, housing and guns—and Madsen Asphalt Paving Plants are the *asphalt arsenals* that are turning out hundreds of tons of asphaltic concrete every hour for these vital necessities of war.

Wartime needs demand *speed* and *efficiency,* and that's what you get with a Madsen plant. *Faster mixing* because it has the Madsen-patented, asphalt pressure injection, Madsen extra-capacity pug mill mixer, and Madsen synchronized plant operations. *More Efficient,* because every feature is field-tested and time-proved. *Portable* because Madsen plants are built in units for easy moving—they are a legal weight, width and height for any highway used by trucks. There are two types: (1) The crane-erection type and (2) the Madsen-patented, jack-erection type.

There are six sizes: 500, 1000, 2000, 3000, 4000, and 6000 lb. capacity. If you have an important wartime paving job, it will pay you to know the facts—write to Madsen Iron Works today! Jack- and crane-erection plants are available in stock!

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ASPHALT PLANTS - ROAD PUGS - [illegible]
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C. & E. M. Photo
Flight 1 of the main-haul belts going into the first tunnel at Anderson Ranch Dam.

Long Belt Conveyor To Serve Earth Dam

(*Continued from page* 22)

he steep side hills of disintegrated gran-te where the access road to the job had o be protected from falling rock.

After operating the belt for the late ummer and autumn and as far into the winter as weather would permit, the con-tractors planned to extend the pit belt ,000 feet in a depressed trench to the west of the present installation, with lat-eral conveyors extending from the main elt. It was planned that excavation would be repeated in successive lifts until ll yardage required was removed.

Wetting Towers

As the material conveyed by the belt was used immediately for the dam em-bankment, it was necessary to provide or adding sufficient moisture to permit aximum compaction on the embank-ent at once. This might have been done y a group of watering trucks on the mbankment but that would have added ot so much more equipment on the dam hich might slow down the spreading peration by the scrapers. To overcome is, the contractors decided to install etting towers on the conveyor system t points where the material was trans-ferred from one flight to the next.

Two such wetting towers were in-stalled to add a maximum of 12 per cent of moisture to the embankment material. The last wetting tower is at the end of Flight 5, a 3-minute run from the dam. A wetting control device was installed, consisting of a Toledo belt weighing unit which controlled the moisture in ½ per cent steps up to 10 per cent by adding or cutting out heavy jets of water through solenoids. Four of these jets were installed under each baffle of the rock chutes. The jets were fanned out so as to hit every particle of material as it dropped from the baffles in its 30-foot passage through the chute.

Safety Devices on Conveyor System

A conveyor system that stretches out over 2½ miles is a potential accident hazard if great care is not taken in the installation of safety devices that will shut off the conveyors instantly if trouble should develop at any point along the entire line. Emergency stop buttons were provided at each transfer whereby all belts in back of the transfer could be stopped at once. Normal stopping was for No. 1 belt to stop and each succeeding belt to stop in 20-second intervals. Each transfer was provided with an emergency automatic cut-off in the events of overloading the hoppers. All starting reversed the normal stopping procedure.

Spreading Embankment Fill

The material from the last flight of the conveyor system was delivered directly into a fleet of six 12-yard LeTourneau scrapers hauled by D8 tractors. These units spread the dirt in 6-inch layers over the top of the embankment where it was compacted by sheepsfoot rollers built to the specifications of the Bureau of Reclamation. These rollers are so large and heavy that a D8 tractor can just handle two 4-foot sections.

The semi-impervious material for Zone 2 was to come from an upstream borrow pit by another conveyor system to be installed later with a scalping screen to take out all over 5-inch stone.

Personnel

The Anderson Ranch Dam was being built under the direction of the Bureau of Reclamation, with John A. Beemer as Construction Engineer and Ferd Schlapkohl as Office Engineer. The contractors are Morrison-Shea-Twaits-Winston, with V. A. Roberts as Project Manager, and William Woodall, General Superintendent.

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WATERLOO, IOWA

Stanolube H. D. practically eliminates troublesome varnish formation and other engine deposits. It keeps valves and rings clean, reducing maintenance, and assuring full mileage and power from your fuel. It keeps oil lines and screens from clogging, assuring a full flow of oil to the bearings, and reduces wear.

Test Stanolube H. D. in some of the hard-working units in your fleet. Compare engine cleanliness and cost of operation of these units with your other equipment.

Good news for your Fleet

Conservation Plans

• A new "heat-fighting" oil has been developed after months of research and laboratory testing. Millions of miles of road and service tests *prove* its unusual quality.

Although civilian use of this oil is now restricted, the need for conserving fleet equipment was recognized. Standard Oil was given the "green light" to put this maintenance-saving oil on any heavy duty Diesel and gasoline powered fleet equipment. This is good news to fleet operators.

Why a heat-proofed oil? Operating temperatures in the modern internal combustion engine have greatly increased during the past few years. This has been brought about, in part, by higher compression ratios, closer clearances, and higher engine speeds. With these increased temperatures, conventional motor oils oxidize 6 to 16 times faster than they did in engines of five or ten years ago. As a result, varnish and sludge troubles appeared even on comparatively new equipment.

Motor oils were tried containing detergents which kept the oxidized parts of the oil in suspension until the oil was drained. But more protection was needed—something to keep the oil from oxidizing at high temperatures.

Stanolube H. D. was the answer. This is accomplished in Stanolube H. D. by adding to a highly refined stock, a special inhibitor developed in Standard Oil laboratories. The resultant oil has both a detergent action and unusual *resistance to oxidation*. It's a *heat-proofed* oil!

★ *heat-proofed* Stanolube H.D. ★

Ask a Standard Automotive Engineer for his suggestions to help you meet ODT fleet conservation requirements. If you operate in the Middle West, there is a Standard Automotive Engineer located near you. These Engineers have been helping fleet operators for years with problems of fleet maintenance. They are doubly busy now, helping fleet men cooperate with ODT by making equipment last longer, improving tire and gasoline mileage, and reducing parts replacement. It will cost you nothing to get this service. Just write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois, for the Engineer nearest you. In Nebraska, write Standard Oil Co. of Nebraska at Omaha.

Oil is ammunition . . . Use it wisely

STANDARD OIL COMPANY (INDIANA)

★ FLEET CONSERVATION SERVICE

Crusher Care

(*Continued from page 42*)

and easily contaminates lubricants.

Place a burlap bag or waste saturated with crankcase drainings on top of the toggle plate at the lower end. This will serve two purposes, to keep out dirt and grit, and to lubricate the bearings. Keep the sliding surfaces of the adjustment wedges and the screws clean, and oil them regularly to prevent rusting. If the adjustment screws are exposed, it is a good idea to tie a piece of cloth around them to keep out grit. This is a small matter that takes only a few minutes, but pays dividends.

Don't over-oil or over-grease, as bearings have to "breathe" and too much lubricant can smother them and actually cause overheating. Be sure to use thinner lubricants in below-freezing weather. It is a poor policy to keep adding oil and grease when it should be changed. Clean the nozzle of the grease gun before using by pumping out one shot of grease. Check the lubrication chart that comes with your crusher and follow its instructions carefully—the manufacturer knows what is needed to keep his equipment in the best condition.

Watch the Operating Speed

When a crusher is run too fast, the jaws will not grip the rock. This causes slippage, cuts the output, and results in excessively rapid wear of the jaws. Do not operate on the theory that every revolution of the eccentric shaft gives a crushing blow and therefore increases the capacity. For example, don't get the idea that 200 revolutions will give 200 crushing blows and 300 revolutions will give 300 blows and consequently increase the capacity of the crusher. There is a peak speed which, when exceeded, causes decreased production.

If a large rock becomes lodged in the jaws and they cannot nip it, disengaging the power and letting the crusher slow down almost to a stopping point will often permit the jaws to grip and break the rock. This demonstrates the fallacy of operating at too high a speed when the jaws merely push the material back up toward the feed opening.

Make a Regular Check-up

Once a day, preferably in the morning before starting up, go over your crusher and tighten all loose nuts and bolts. Check them occasionally through the day. Make an especially thorough check after moving to a new location. The places which need the most careful watching are the jaw wedge bolts, wear plate bolts, bearing cap bolts, pitman bolts and foundation bolts. Loose parts cause friction or pounding, resulting in rapid wear or breakage.

Be sure there is no side play in the bearings. Locking nuts can be quickly tightened. Loose bearings wear out many times faster.

Be sure the movable jaw is centered so that it does not rub either cheek as this causes premature wear and tends to overheat the bearings because of the drag. Also be sure the crusher stands level so that rock does not gravitate to one side, causing uneven wear, and so that the thrust on the bearings is equalized.

Don't raise your adjusting wedge too high in an effort to get fine crushing. Use a longer toggle, when necessary. For finest adjustment, close the jaws until they touch lightly and then slack them off a little for clearance. Always be sure that the toggle seat or bearing on the back of the pitman is tight. Adjust the jaws for size when the crusher is running empty. The tension spring should be loose enough to permit free operation, but not loose enough to permit knocking.

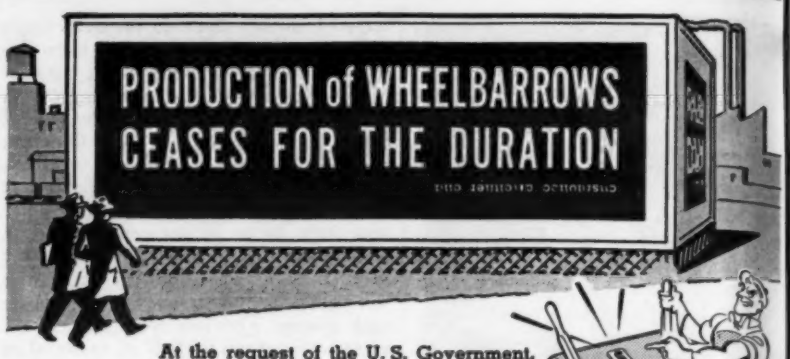
Conclusion

Observe these suggestions and you will be helping our nation to conserve metal, your equipment will last longer and, of course, you will be helping yourself to "stay in the running".

Reinforcing Dirt Roads

The old dirt road may be a thing of the past, but it also looms as the highway of the future—with modern improvements. Walter E. Irving, President, Irving Subway Grating Co., Long Island City, N. Y., predicts that sand roads will have a large part in post-war development, linking the North and South American continents with innumerable arteries of communication.

The company recently revealed the results of tests made over a period of 14 years at its Long Island City "proving grounds". These show, according to Mr. Irving, that ordinary steel grating, packed with sand and sprinkled with oil, provides a smooth roadway as durable as many of our present accepted surfacing methods.



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At the request of the U. S. Government, the production of contractor wheelbarrows has ceased for the Duration. Today, Sterling's entire plant is 100% devoted to war production. While we are happy to assist in the war effort, we regret our temporary inability to supply our good customer friends. It has been a real pleasure to serve you in the past 39 years, and we are looking forward to the post war era when we can again take care of your normal requirements.

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Wartime Road Care: Some Suggestions For Your Program

With new construction practically eliminated for the duration, highway and street men are faced with the question, "What are the most essential things we should concentrate on now?" Here are the excellent suggestions of Professor Ben H. Petty, Captain, Corps of Engineers, U.S.A.

1. Maintenance of road and street surfaces is essential, of course, in order that the traveling public may be satisfied and to the end that the investments in these surfaces may be conserved by the attainment of maximum life expectancy. It is trite to say that such maintenance should be done *promptly* and *adequately*, but a casual inspection trip over a representative group of roads from the lowest to the highest types in almost any state will reveal the need for the frequent repetition of this warning.

2. Cracks and joints in rigid pavements should be filled with bituminous or other suitable materials at least once each year—and *not* when they are closed.

3. Those dangerous low shoulders along pavement edges, which cause many fatal accidents each year, should receive a "face lifting" promptly and, especially on narrow pavements, they should be stabilized until the pavement can be widened.

4. In the case of black-top (intermediate bituminous surfaces), the promptness of maintenance operations is of utmost importance. Prolonged delay in patching surface breaks or in applying the periodical surface treatment results in wasteful expenditure of funds to restore the surface. We trust the powers-that-be will continue to provide sufficient quantities of bituminous materials to repair and renew these surfaces as needed.

5. In the guise of economy, some things may be done which will bedevil the maintenance men for years to come. For example, should some road authority foolishly order the discontinuance of screening and crushing of the aggregate for maintenance of unstabilized gravel roads, otherwise perfectly good roads will be ruined indefinitely by resurfacing with oversized rock. The minor saving resulting from this resort to pit-run gravel (running to larger than ¾-inch particles) will be nullified many times over by increased drag maintenance costs and greater wear and tear on motor vehicle tires, to say nothing of the discomfort to motorists in riding over these rough surfaces that cannot be smoothed by any known maintenance operation, excepting stabilization.

6. Many road officials are pondering the feasibility of cutting down on the frequency of drag maintenance operations on unstabilized gravel and stone roads during the war. Certainly this will reduce maintenance costs and save on drag equipment; however, it will mean rougher roads and more rapid tire and mechanical wear for the motors. Naturally, drag maintenance operations can and should be reduced somewhat in proportion to the reduction in traffic. But the complete elimination of dragging (without resorting to calcium or sodium chloride stabilization) will develop some abominable gravel and stone roads in a relatively short period of time. Let your conscience be your guide!

7. In these days when the purchase of new equipment is practically impossible, competent mechanics in each county or state highway garage are absolutely essential and no hidebound low-wage scale should be retained as a barrier to holding these men against the competition of industry and private construction. Those trucks, tractors, graders, etc., feeble as some of them may be, must be "kept rolling". Repair parts, new blades, etc., are limited and good mechanics may spell the difference between going ahead or practically stopping road work before this emergency ends.

8. Many new commissioners have taken office January 1, 1943, and some may feel in the mood to economize by eliminating the clerical help in the office of the Road Supervisor or Surveyor. This attitude is deplorable. The saving of only $50 to $200 a month by doing without clerical assistance may and probably will be discounted many times over by wasteful expenditure of funds resulting from the lack of accurate and useful records on equipment performance, various types of maintenance and improvement operations, relative values received from various competitive types of materials, etc. Then there is the preparation of payrolls, keeping the budget records up-to-date, preparing the required reports for the State Board of Accounts, and many similar duties. The Road Supervisor should be freed from these tasks so he can give his full time to the proper planning and supervision of the work of his department with frequent field trips to check on progress and procedures. Can you imagine any business concern grossing from $100,000 to $300,000 a year with no one in the office but the general manager?

9. Drainage is an important word in the vocabulary of highway engineers and officials but there are thousands of miles of roads which have never been treated to its beneficent effects. There are few better ways to save on that road budget than by the prompt and continuing application of the principles of the drainage to your roads. Open up those side ditches and *keep* them open. Install adequate culverts and *keep* them open. Subdrainage, where desirable and feasible, should not be overlooked. Instead of repatching those breaks in black-top roads near hill-tops year after year, why not give French drains a trial if the subgrade soil is drainable?

10. How about a survey of bridge pier and abutment conditions in your jurisdiction, followed by utilization of spare time during the coming months in making out a carefully prepared program of patching, underpinning, repointing, etc., to be started this year as soon as weather and stream flow conditions are suitable? Removal of debris, bushes, and trees interfering with the proper channel flow at bridge and culvert approaches will save many dollars otherwise required for repairs later.

Heavy-Duty Self-Powered Rock-Hauling Equipment

Three new bulletins, describing and illustrating Model F Euclids for quarry work and heavy-duty earth and rock hauling, have recently been announced by the Euclid Road Machinery Co., Cleveland, Ohio, which will be glad to send copies of these bulletins on request.

No. JR-7 contains information on the service rendered by the Model F bottom-dump Euclid; No. 2FDQ-101 contains specifications and mechanical details of the 15-ton Model F; and No. J-6 describes these Euclids in quarry work.

How to get
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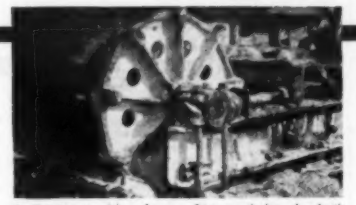

Driving tumblers from a 2½ yard shovel rebuilt with high carbon electrodes ordinarily last four months. The tumbler illustrated above which was rebuilt with high carbon electrodes then hard-faced with ¾" Coated Stoody Self-Hardening has been in service more than a year.

The useful life of tractor rollers in one logging company was 90 days. Rebuilding rollers to their original size and shape with ¾" Coated Stoody Self-Hardening as shown extended life to one year.

To maintain one ordinary ditcher tooth for 30 days cost one construction company an average of 58c. The cost of maintaining a tooth hard-faced with 20-30 Acetylene Tube Borium for the same period is 19c.

These hard-faced sheepsfoot tampers maintained regulation tamping area four times longer than those not protected. Cost of applying ¾" Coated Stoody Self-Hardening was 60% of new tamp cost.

Stoody Alloys make similar savings on all types of wearing equipment. Free wall chart for welding departments describes and illustrates recommended procedures for prolonging equipment life. Send for your copy now.

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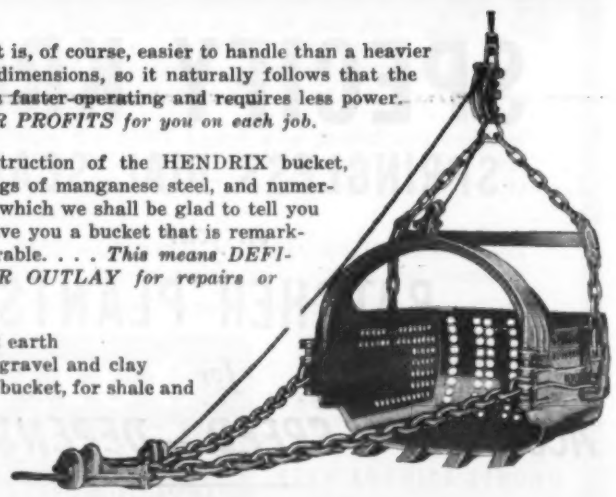

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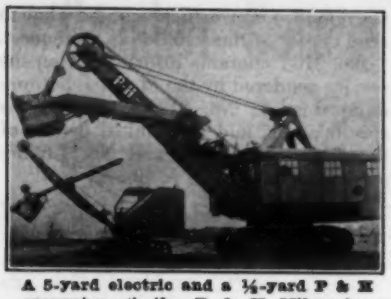

A 5-yard electric and a ¼-yard P & H excavator at the P & H Milwaukee Proving Grounds.

Resting After a Work Out

These two extremes in the P&H excavator line are shown as they rested during the lunch hour, after a morning work out on the Harnischfeger Corp. proving grounds in Milwaukee, Wis. The gigantic 5-yard Model 1500 P&H electric stands over 35 feet from ground to boom point, with an overall length of about 60 feet. Having satisfactorily completed a prescribed course of rigid checks and tests under actual working conditions on the expansive proving grounds, the machine was disassembled for shipment to a large mining operation.

The ½-yard Model 150, which features quick conversion to crane, dragline, hoe, etc., is an all-round excavator which is doing wide service on many war jobs. Both models have P&H low-pressure hydraulic control for actuating the clutches and brakes.

Complete information regarding these two machines may be secured direct from the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis., by mentioning this item.

Buy U. S. War Bonds regularly.

White Personnel Changes

Two changes in its executive personnel have been announced by the White Mfg. Co., Elkhart, Ind. W. McKean White, Jr., Vice President, is on a leave of absence and is now a 2nd Lieutenant, U. S. Army Air Corps, serving as Assistant Supply and Engineering Officer, 384th Bombardment Group. Merritt A. King has joined the White Mfg. Co. as Assistant to W. McK. White, President. Mr. King has had extensive experience in the construction machinery field, having been associated with the Good Roads Machinery Co., General Construction Equipment Corp., Hillsman Equipment Co. and the Godfrey Conveyor Co.

The White Mfg. Co. produces construction and railway equipment, including asphalt plants, aggregate driers, bituminous mixers, concrete vibrators, tractor shovels and loaders, tar heating kettles, and railway side and center bearings. At present, it is engaged principally in war production.

Treat Electric Drills Right

A new handbook, designed to show new workers the correct methods of using B & D portable electric drills in order to obtain the greatest efficiency and longest life, has been published by The Black & Decker Mfg. Co., Towson, Md. The booklet covers such points as assembling the drill, the switch control, drill chucks and bits, how to use the drill, and several important points on maintenance and care.

A copy may be secured by writing to the Advertising Dept., The Black & Decker Mfg. Co., asking for "The Drill Use Book" and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

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Translode Angle-Unit Expansion and Keylode Contraction Joint are contributing to the War Effort. Fifteen to twenty percent more steel can be diverted to more vital needs by using Translode and Keylode in place of the conventional Dowel Bar Joint.

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The Model E-1 F-11 Auto-Railer* munitions train shown is used for the transportation of explosives in a large ordnance plant. Its payload capacity is 40 tons—10 tons in the locomotive and 15 tons in each trailer.

In the Auto-Railer*, the Evans Products Co. of Detroit utilizes not only the greater flexibility of Waukesha Engines but their greater dependability which comes from super power and stamina, smoothness and acceleration, high fuel economy, longer life and lower upkeep.

Get Bulletin 1079.

*Registered Trademark of Evans Products Co., Detroit, Michigan, the manufacturers

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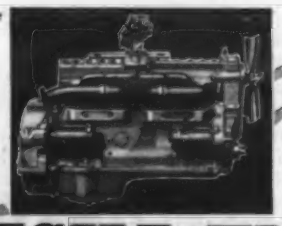
Model SRKR Waukesha Engine



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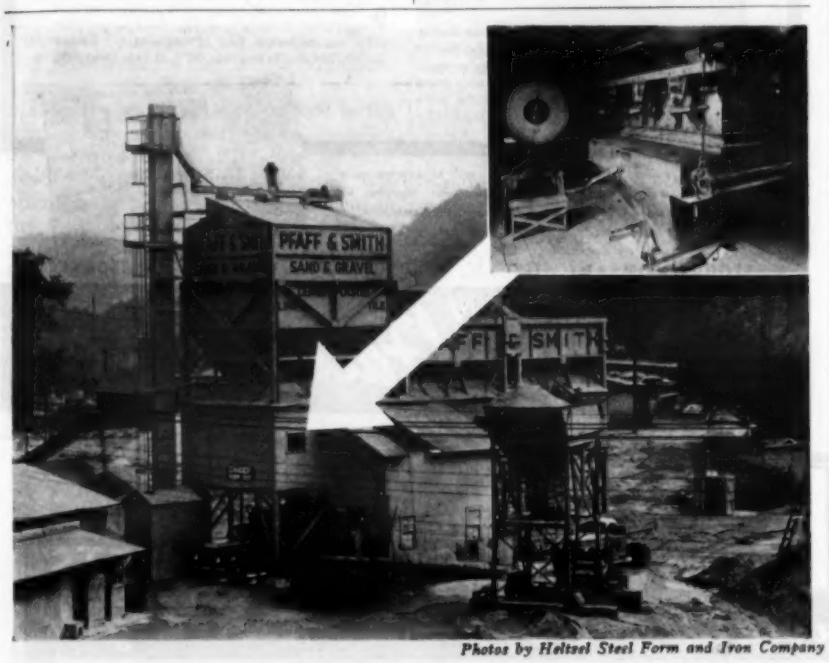

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Concrete Culverts Save Steel for War

Arizona Saved 65.5 Tons Of Reinforcing Steel on One Job; Only 6.3 Tons Used on Access Road

ONE of the best examples of a determined effort to save steel for war purposes comes from Arizona where on an access road a total of 65.5 tons of steel was saved by the elimination of seven corrugated-metal pipe culverts and ten reinforced-concrete box culverts, the use of unreinforced-concrete arch culverts, and the changing of three reinforced-concrete structures to timber bridges. By these changes only one-tenth the amount of steel usually required was used to complete the work quickly and safely, and the total cost of the structures was actually reduced nearly $1,400, no mean sum in these days of reduced state highway income.

CMP to Arch Culverts

In this first group there were seven structures in the category of "less than 20-foot clear span" which called for corrugated-metal pipe under ordinary conditions, but which were changed to unreinforced-concrete arch culverts. The structural excavation was increased 120 cubic yards and channel excavation increased 60 cubic yards by the change. The Class A concrete needed was 134.82 cubic yards as compared with none for the metal culverts; the steel reinforcing, 550 pounds as compared with a total of 552 feet of 30 to 48-inch metal culverts. The cost of the structures in this group was increased from $3,038 to $3,534.38. The saving in steel, however, amounted to 13 tons with only 0.3 ton actually used.

R.C. Boxes to Arch Culverts

There were ten reinforced-concrete box culverts changed to unreinforced arch culverts at an increase in cost of $2,166.71 but at a saving of 25.4 tons of steel and an actual use of only 1.5 tons of steel. These consisted of structures of less than 20-foot span. The structure-excavation item was decreased 50 cubic yards, channel excavation increased 120 cubic yards, and Class A concrete increased 240.11 cubic yards but steel, the critical material, was reduced by 50,755 pounds.

R.C. Boxes to Timber Bridges

In this group three structures with spans over 20 feet were changed from reinforced-concrete box culverts to timber bridges at a saving in cost of $4,057.99, and a saving in critical steel of 27.1 tons, while 4.5 tons was actually required. The other items included a reduction in structural excavation of 180 cubic yards, the elimination of 548.92 cubic yards of Class A concrete, the saving of 63,170 pounds of reinforcing steel, offset by the use of 4.5 tons of hardware in the construction of the timber structures.

The Story in Tabular Form

The accompanying table tells the story completely for the benefit of the reader who wants to see how one state actually made the shift and saved money at the same time. The changes in design of these twenty structures resulted in a total savings of 65.5 tons of critical material saved, with only 6.3 tons of critical material used, and a decrease of $1,394.90 in total cost.

Personnel

The tabulation of the savings and use of the various materials and other items on the Fort Huachucha-Bisbee Highway, Cochise County, Arizona, were furnished through the courtesy of R. A. Hoffman, Bridge Engineer, Arizona Highway Department.

Savings Effected by Redesign of 20 Drainage Structures On One Arizona Project

	Item	Unit	ORIGINAL—CMP CULVERTS Quantity	Unit Price	Amount	REVISED—PLAIN CONC. ARCH CULVERTS Quantity	Unit Price	Amount
7 STRUCTURES	Str. Excav.	C.Y.	50.00	$ 1.25	$ 67.50	170.	$ 1.25	$ 212.50
20-Foot Clear	Chan. Excav.	C.Y.	70.00	.35	24.50	150.	.24	31.20
Span or Less	Class A Conc.	C.Y.	....			134.82	24.00	3,235.68
Changed from	Reinf. Steel	Lbs.	....			550.	.10	55.00
CMP to Plain Conc.	30" CMP	Lin. Ft.	234.00	4.00	936.00	...		
Arch Culverts	36" CMP	Lin. Ft.	130.00	5.50	715.00	...		
	42" CMP	Lin. Ft.	136.00	6.50	884.00	...		
	48" CMP	Lin. Ft.	52.00	8.00	416.00	...		
	Totals				$ 3,038.00			$ 3,534.38

(In the revised plans, 0.3 ton of critical material was used, 13.0 tons of critical material was saved, and the total cost was increased $496.38)

			ORIGINAL—R.C. BOX CULVERTS			REVISED—PLAIN CONC. ARCH CULVERTS		
10 STRUCTURES	Str. Excav.	C.Y.	790.00	$ 1.25	$ 987.50	740.	$ 1.25	$ 925.00
20-Foot Clear	Chan. Excav.	C.Y.	3,350.00	.35	1,172.50	3,470.	.24	832.80
Span or Less	Class A Conc.	C.Y.	583.64	24.00	14,007.36	823.75	24.00	19,770.00
Changed from R.C.	Reinf. Steel	Lbs.	53,765.00	.065	3,494.73	3,010.	.10	301.00
Box Culv. to Plain Conc. Arch Culv.								
	Totals				$19,662.09			$21,828.80

(In the revised plans, 1.5 tons of critical material was used, 25.4 tons of critical material was saved, and the total cost was increased $2,166.71)

			ORIGINAL—R.C. BOX CULVERTS			REVISED—TIMBER BRIDGES		
3 STRUCTURES	Str. Excav.	C.Y.	640.00	$ 1.25	$ 800.00	460.	$ 1.25	$ 575.00
Over 20-Foot	Chan. Excav.	C.Y.	500.00	.35	175.00	500.	.24	120.00
Clear Span	Class A Conc.	C.Y.	548.92	24.00	13,174.08	...		
Changed from	Class B Conc.	C.Y.	.....			33.26	24.00	798.24
R.C. Box Culverts	Reinf. Steel	Lbs.	63,170.00	.065	4,106.05	...		
to Timber Bridges	Treated Timber	MBM	.....			62.8	174.00	10,927.20
	Hardware	Tons	.....			4.5		
	Treated Piling							
	Furn. & Deliver	Lin. Ft.	.....			922.	1.35	1,244.70
	Driving	Ea.	.....			76.	7.00	532.00
	Totals				$18,255.13			$14,197.14

(In the revised plans, 4.5 tons of critical material was used, 27.1 tons of critical material was saved, and the total cost was decreased $4,057.99)

The Dangers Ahead In Highway Fields

During times of stress it is necessary that administrators anticipate and guard against the likelihood that hasty judgments may overthrow proved and established principles of procedure. This applies equally in the highway field, as pointed out by M. J. Hoffmann, Commissioner, Minnesota State Highway Department, in his discussion of the topic "Effect of War on the State Highway Departments and Their Programs" at the annual convention of the American Association of State Highway Officials. Mr. Hoffmann recognizes five distinct trends, each of which he feels has a foreboding implication and consequently must be given most serious consideration by highway administrators. These trials and dangers which lurk ahead are:

1. Ill-considered group efforts within the states to reduce motor-vehicle license fees and gas-tax rates, on the ground that, with construction rigidly limited for the duration, highway revenues will exceed immediate needs.

2. Movements to suspend, in whole or in part, state license fees of motorists who lay up their cars for definite periods of time.

3. Attempts at further diversion of highway funds or cancellation of Federal-Aid authorizations.

4. Post-war efforts to discard or disrupt long-proved principles of Federal highway assistance.

5. Efforts to continue indefinitely in the hands of Federal agencies certain expansive emergency powers now temporarily exercised over state highway affairs.

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PAGE Automatic DRAGLINE BUCKETS

BOOST PRODUCTION

KEEP AMERICA STRONG

Well-Planned Dept. For County Work

(*Continued from page 17*)

which was donated to the USO, the Red Cross and the Army and Navy Relief. New donations were being received every day throughout the summer.

A function not usually performed by counties which are not corporate entities with the city is the collection of garbage. Salt Lake County hauls garbage from every residence outside the city once a week, serving 60,000 people with two Dodge trucks, one equipped with a Gar Wood Load-Packer and the other truck is soon to be similarly equipped. The trucks travel 315 miles per week each in this collection service.

In a building adjacent to and connected with the county garage is the county fire department equipment, consisting of three pumpers and also a new piece of equipment made in the county shops to provide quick service for grass fires. It consists of a small truck with a 750-gallon tank filled with water, with the usual grass-fire equipment, including shovels and knapsack pumps, on the sides. The machine itself has a small pump mounted behind the cab. The fire department consists of five paid men; three drivers, one chief and one assistant chief; and thirty-six volunteers. Housed with the fire equipment is a new fully equipped ambulance, the property of the county.

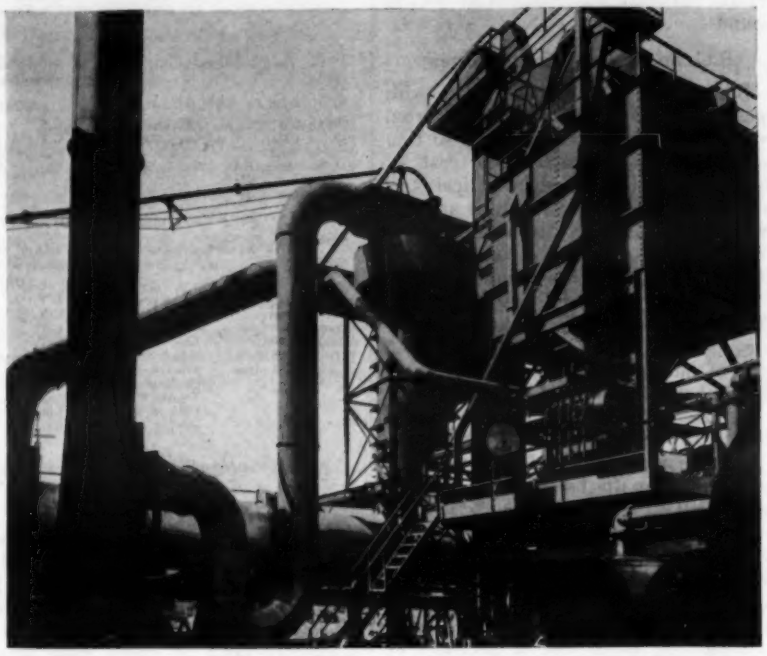
There are 3 miles of General Electric sodium-vapor lighting installed by the county on South State Street outside city limits. This is believed to be the largest installation of sodium-vapor lights between Chicago and the Golden Gate.

New Liquid Coating For Use in Welding

After months of field testing under a wide variety of service conditions, a new liquid coating designed to prevent adhesion of welding spatter has been announced by The Midland Paint & Varnish Co., 9115 Reno Ave., Cleveland, Ohio. According to the manufacturer, this liquid, known as No-Spat, should be brushed over the seam and area where weld spatter may fall. After welding, the spatter may be wiped away, without chipping or grinding.

Another feature claimed for No-Spat is that it fuzes with the molten metal and maintains maximum tensile strength by floating off impurities, prevents porosity, and stabilizes the arc, thus minimizing rod spatter and saving rod metal. It is also stated that No-Spat is an adequate rust protector, will not freeze, and may be used over the full welding range of amperage and voltage.

Further details on No-Spat may be secured direct from the manufacturer by referring to this item.



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A. E. M. Photo
District 2 office of the Texas Highway Department in Fort Worth.

exas District Has Well-Equipped Shop

(*Continued from page* 45)

ll press; alongside this is a home- stand with a ball-bearing top for ding the entire set of various sizes of t drills for the drill press; a Manley ton hydraulic press; a steel cabinet taps, dies, die stocks, and a plate l top for surface plate; a small Delta ll press; a Sioux valve refacing ma- ine; and a Canton No. 6 portable floor ne with a safety clutch so that the l cannot be dropped.

The Stock Room

At the time of our visit, the 60 x 80- t stock room was filled to repletion h the needs of the District, including tock of wire rope, yellow traffic paint, d a goodly supply of aluminum hicle paint. There are three lines of uble wooden bins with each section mbered in accordance with the stock d numbers so that the items may be ated readily. A heavy rack of 4 x 4- h timber holds an ample stock of tool el, while next to it is a similar square k for truck springs. A brake-lining achine gives the stock clerk some work his spare time.

A well-built circular bin with com- rtments for each size of nail is set on roller bearing in the floor so that it n be revolved for convenience. A arate two-sided cabinet holds the ge stock of bolts and nuts on one side d cap screws on the other.

Carpenter Shop

The carpenter shop is a galvanized n building 30 x 75 feet, in which is cluded the sign shop. In the wood- rking section is a Delta power jointer, home-made power rip saw, a Delta -inch band saw, a Mall sander, a Black Decker electric drill press, and a me-made cut-off saw hung from the ling, equipped with rules on the sides measure blocks for quick cutting, and set as to be able to make cuts 24 hes wide.

The sign shop has a big exhaust fan the end to remove paint fumes during ray-painting of wood signs. These e set up on welded steel angle horses th angle stringers, making a minimum obstacles to the painting. Both plain d reflector wood signs are built here d painted from silk stencils and cut ncils. Before shipment to the various cations, the signs are wrapped in xed paper to protect them from ratching. When communities have ecial civic slogans, the District makes ecial signs in the spirit of the slogan r them.

Blacksmith and Welding Shop

The blacksmith and welding shop is uipped with a power trip hammer, d a large vise bolted to a pair of avy channels set in the concrete floor that the blacksmith can get around his work more easily. Then there is a forge and an anvil and a Lincoln electric welder.

Next to this shop is a stall for washing and greasing trucks and cars. It is equipped with a lift for trucks, a Kerrick-Kleaner for grease and paint removal, and an Alemite electric lubricator.

Gas and Oil Service

A gasoline and oil station is located in the center of the yard, with rectangular tanks for the various grades of lubricant required for the trucks. They are filled directly from the local distributor's truck. Outside is the gasoline pump, and air and water services.

Office Building

The office building is an attractive yellow brick 60 x 40-foot structure of two stories. On the first floor is the District Engineer's office, the office of the General Foreman, A. M. Moore, the reception lobby, and the accounting office about 18 x 40 feet. An interesting item of economy is the planning of the meeting of the county foremen. They come into the office on the first and sixteenth of the month and bring their payrolls for the accounting department. They then remain the balance of the day in conference with the General Foreman so that if the accounting department finds anything that needs some additional data to go through promptly they have the foremen right there to consult immediately.

On the top floor are the offices of the Chief Resident Engineer, F. E. Lovett, the construction accounting office and drafting room.

American Manganese Steel Appoints Vice President

The American Brake Shoe & Foundry Co. has announced the appointment of James R. Hewitt as Vice President of its American Manganese Steel Division. The appointment dates from January 1, 1943.

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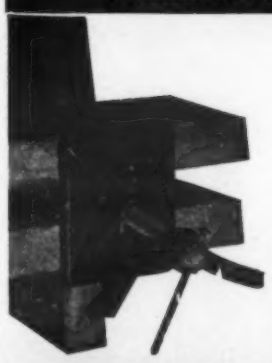
There will be a tremendous amount of dam construction after the War, the Bureau of Reclamation reports.

Start laying your plans now—and be sure to write for complete details on the Williams Tie Rods.

WILLIAMS "VIBRA-LOCK" CLAMPS



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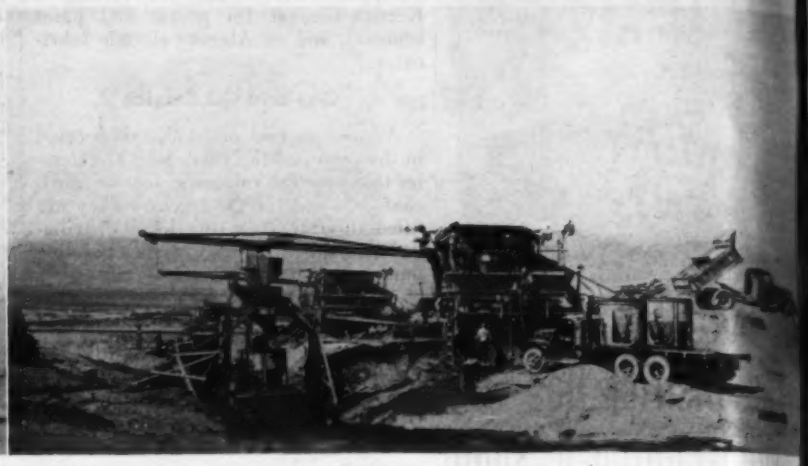
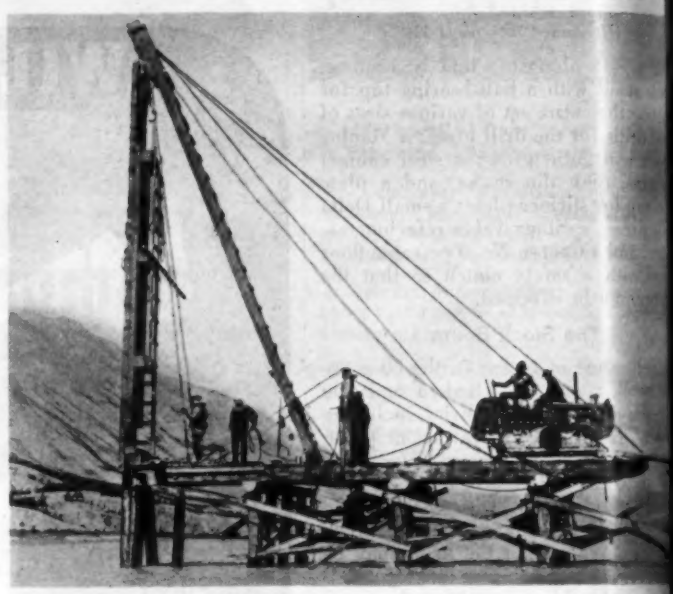


C. & E. M. Photos

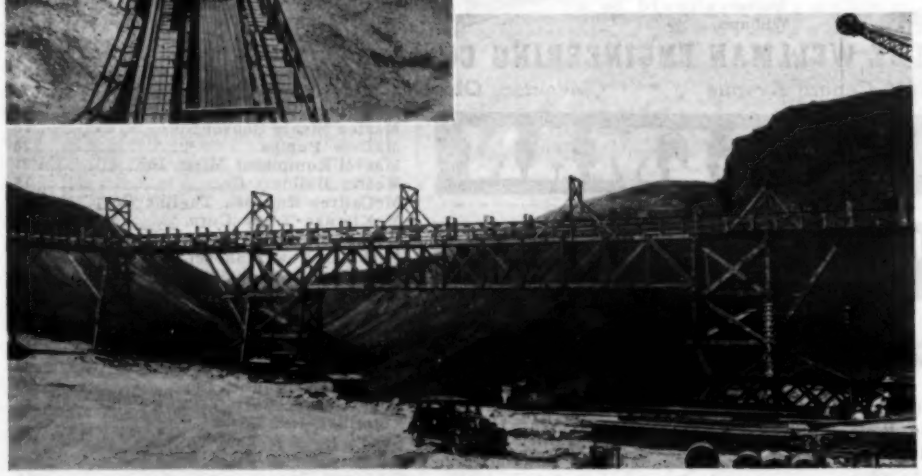
Producing concrete for igloos at a mountain-state Ordnance Depot. At left above, a Johnson plant, one of the three which batched the concrete on this job, and at right above, a pair of Rex pavers which mixed the igloo concrete.
See page 11.

At right, bridge construction on the Alcan Highway. A Hyster D4 tractor donkey in use driving wooden piles is typical of the tractor-mounted equipment which played so important a part in the construction of this vital route.
See page 19.



Views of the 2-mile belt conveyor erected to deliver earth to Anderson Ranch Dam in Idaho. At left, Flight 2, 1,527 feet long, on a catenary to avoid a trestle higher than the 100-foot structure built. Below, an 80-foot wood truss span, using Teco connectors, to conserve steel in carrying the conveyor belt over the spillway area at the dam.
See page 22.

C. & E. M. Photos



Unloading block sod on Baker Bros. roadside-development contract on U. S. 81 in Comal County, Texas.
See page 21.

C. & E. M. Photo

Typical of the Salt Lake County Highway Department's activities are these scenes above. At left, the layout of the County's combined gravel and asphalt plants which provide material for the County's roads; and, at right, the Snogo owned by the County working on a drift in the hill section of Salt Lake County, Utah.
See page 1.